THE JOURNAL OF GAS LIGHTING
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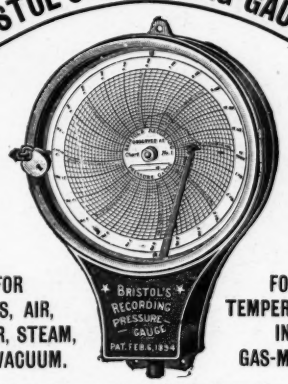

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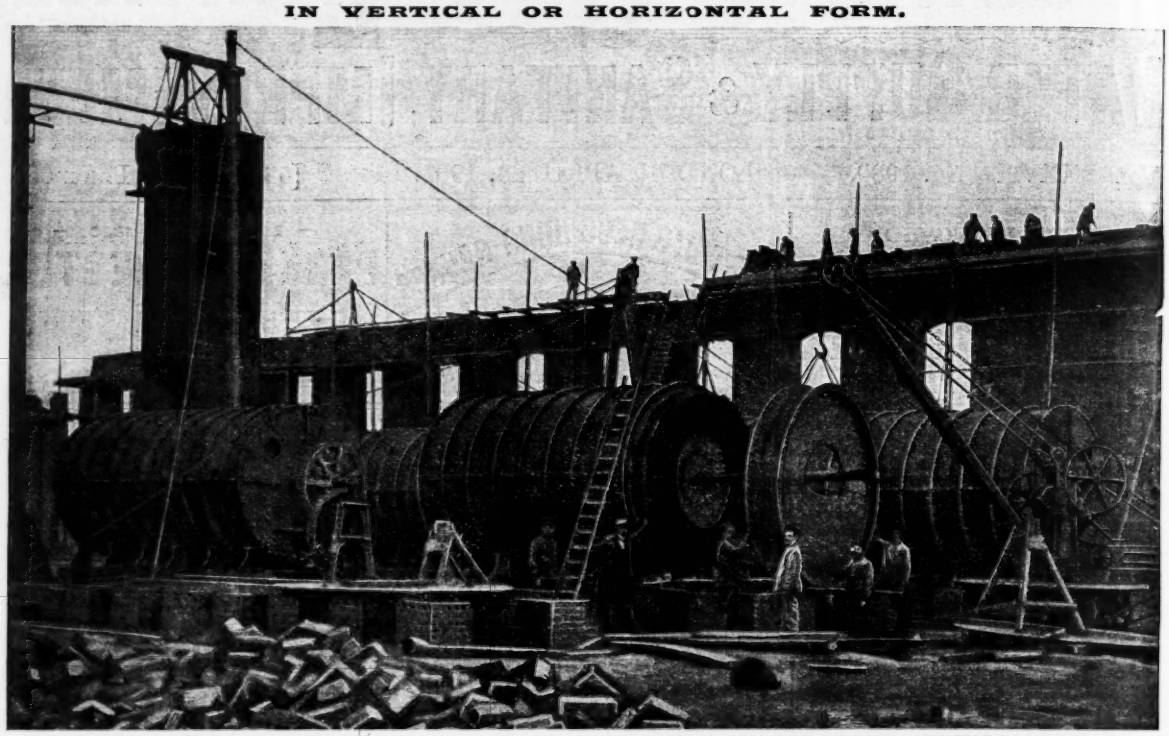

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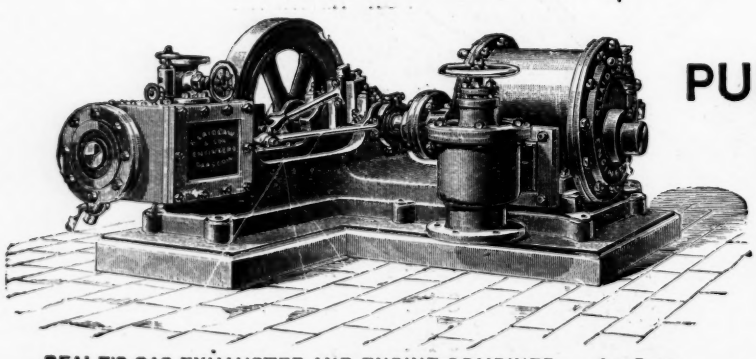

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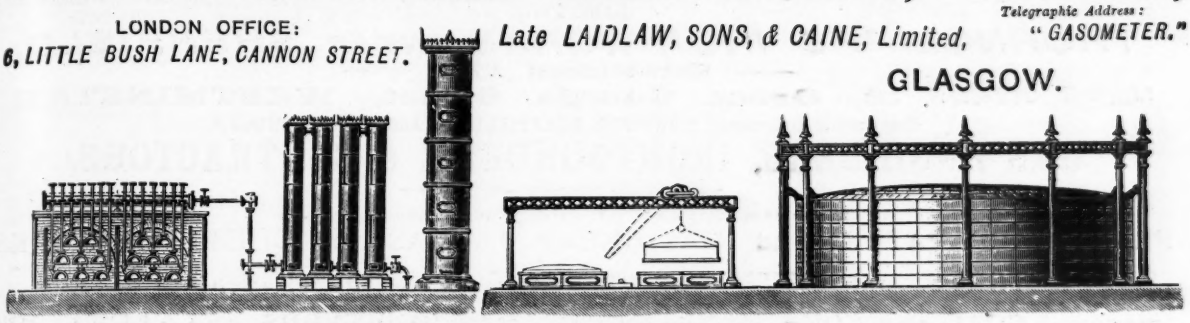

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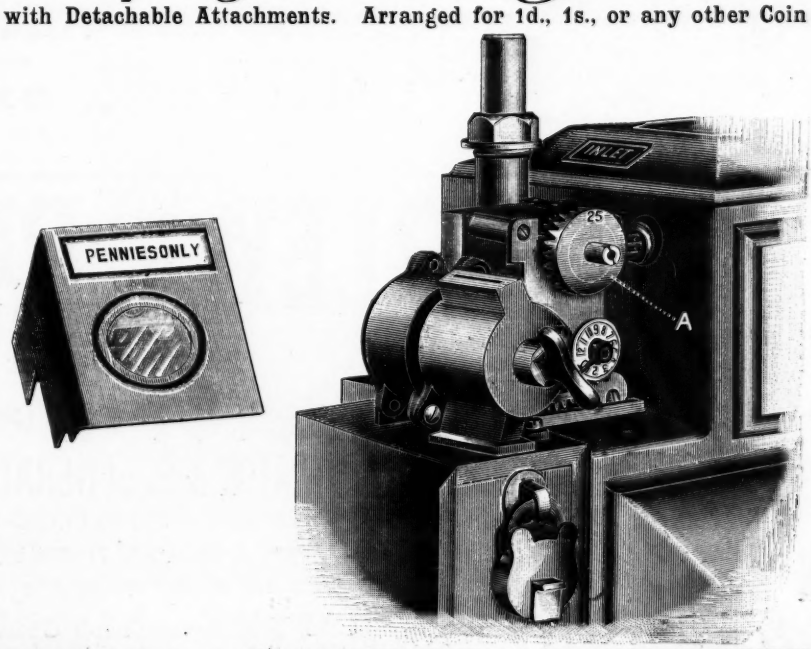

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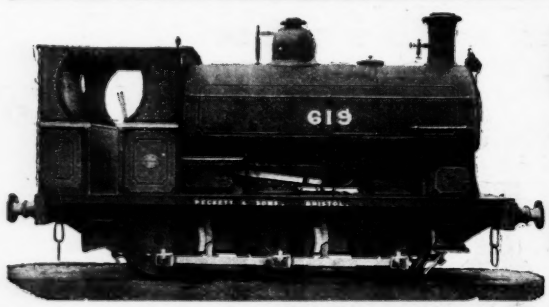

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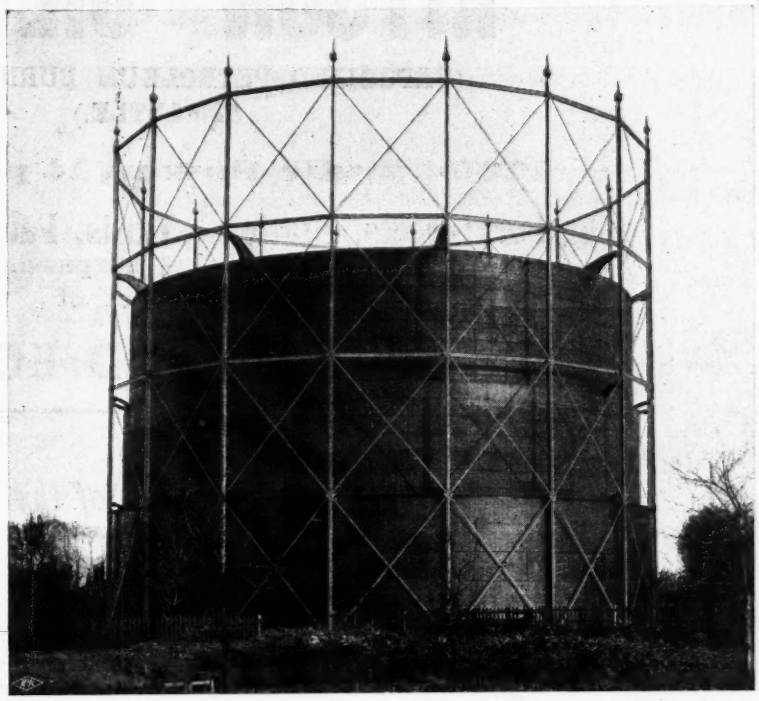

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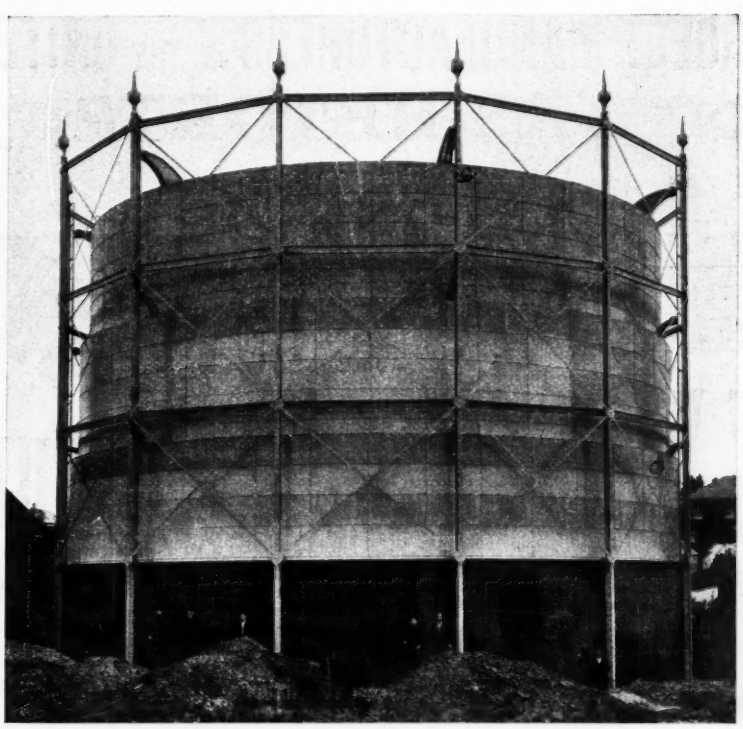

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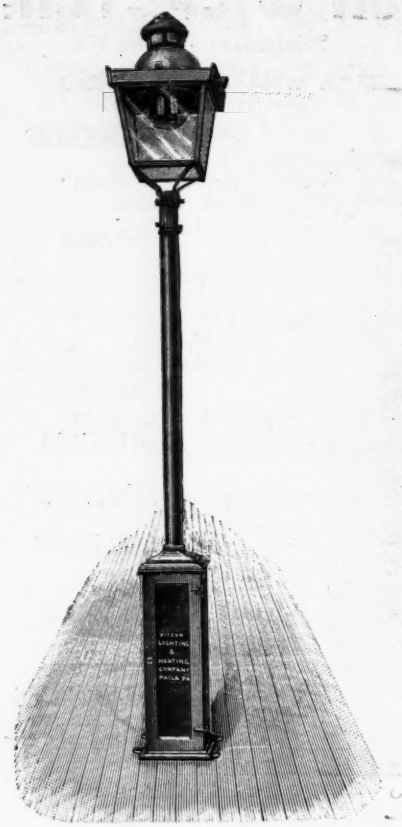

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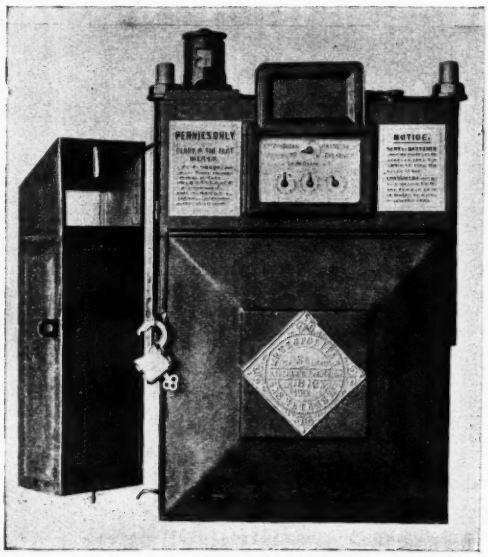

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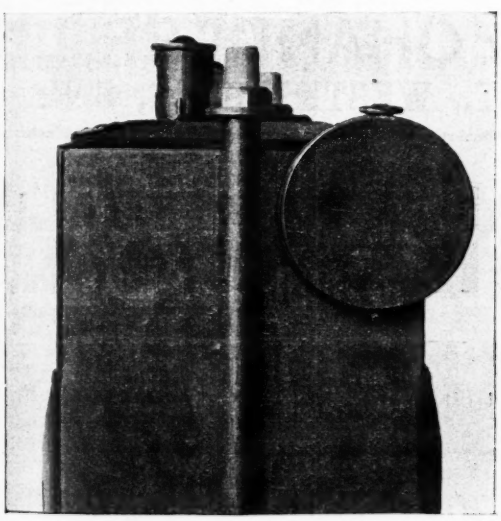

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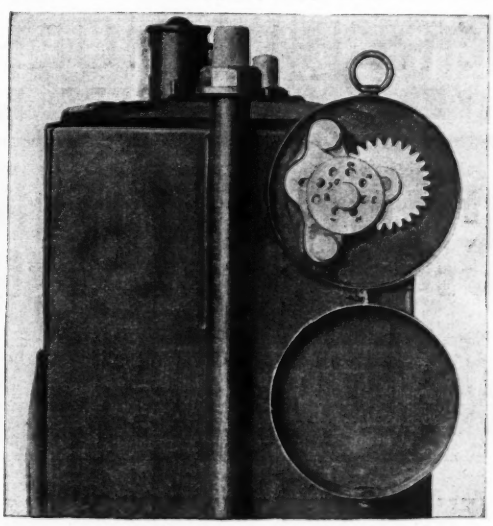

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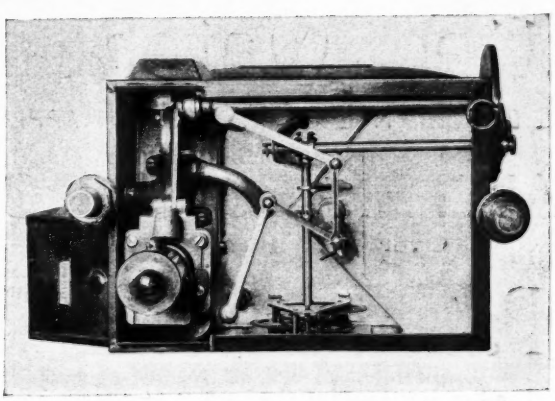

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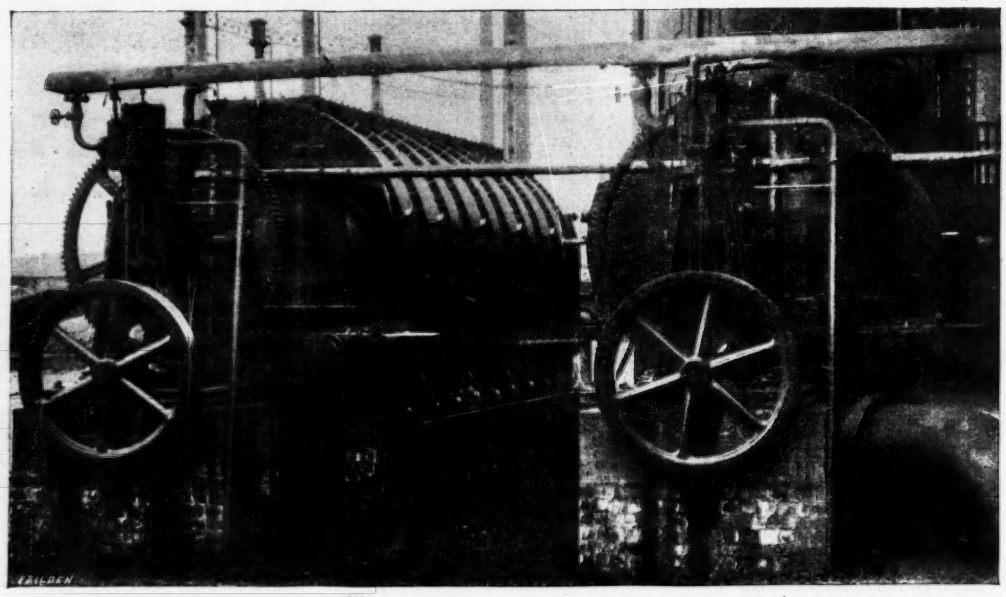

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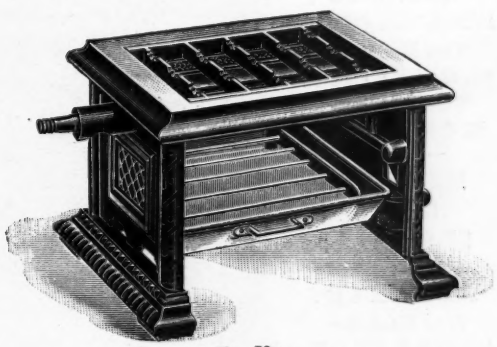

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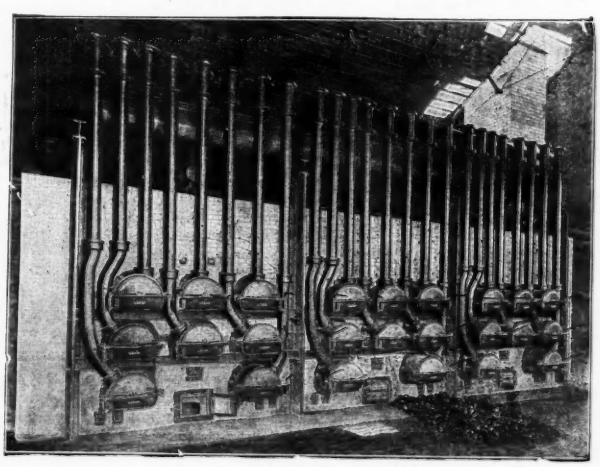

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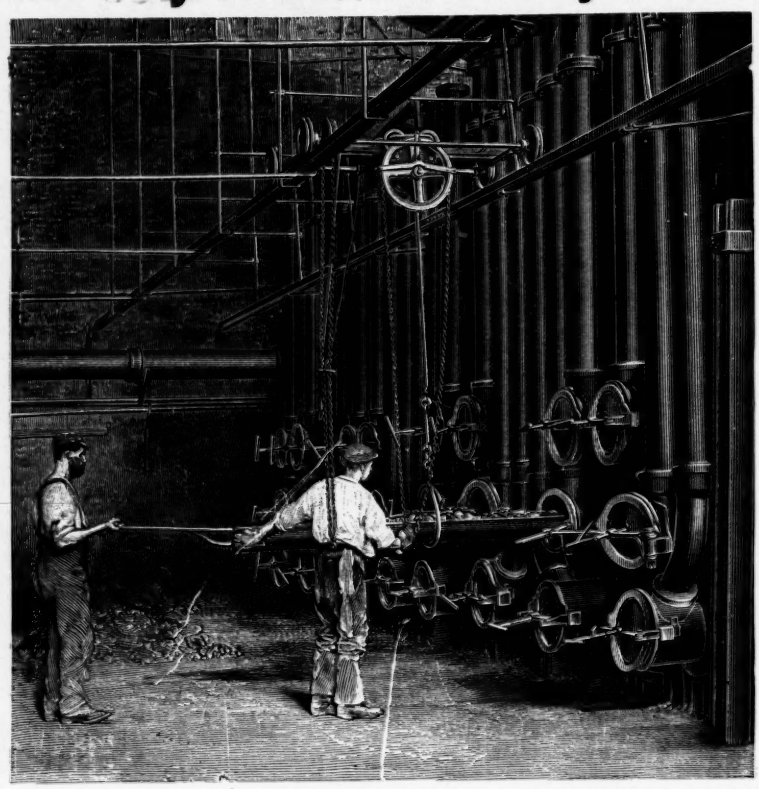

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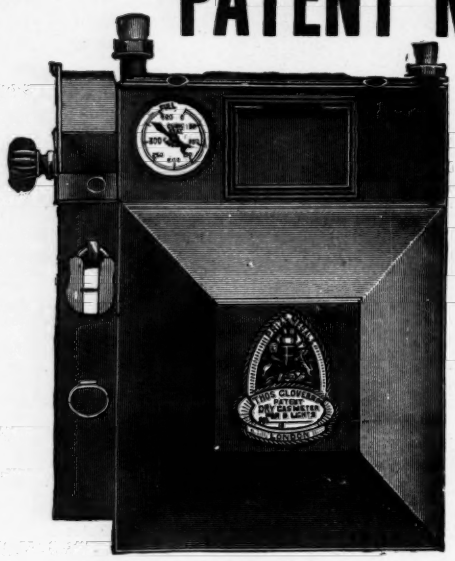

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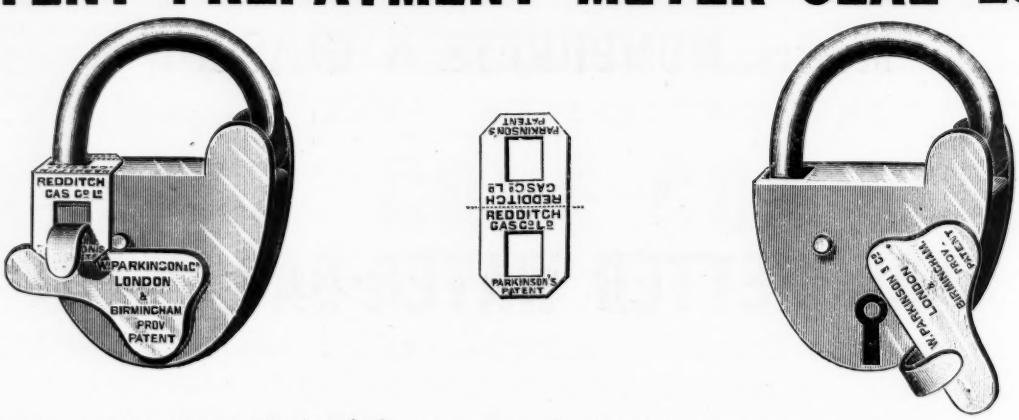

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JOURNAL OF GAS LIGHTING, WATER SUPPLY, &c.

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EDITORIAL NOTES.

The Budget Proposals—An Export Duty on Coal.

THURSDAY last was the great day of the parliamentary year, when the Chancellor of the Exchequer presented his Budget; and many hopes and fears received their *quietus* or their confirmation. The state of the country's finances was such as to render the task of any present Chancellor both easy and difficult. It was made easy by the resignation of every serious citizen to an inevitable increase of taxation, which, so to speak, cleared the ground for the "preamble" of the Budget. It was made arduous by the consideration that the additional amount of revenue to be provided by extra or higher taxation was expected to be very large. Our readers will not thank us for repeating after this interval of time the principal figures of the Chancellor's statement. The points of permanent interest in the Budget speech are those which arise out of the balancing of direct and indirect taxation, and also out of the new taxes levied to meet the exceptional necessities of the times, but probably destined to remain regular sources of national revenue. On the first-named subject, it will suffice to admit that an increase of the income-tax was both necessary and expedient. This impost has always been esteemed a war tax, to be paid by the classes of citizens who are somewhat invidiously described as having a stake in the country—as though the country belonged more to them than to all the subjects of the realm; and inasmuch as it falls heavily upon those moneyed people who have the guidance of public affairs, it is just that its amount should rise when peace is broken. Moreover, unless the payers of income-tax were first made to contribute their share of the cost of a war, it would be impossible to levy other taxes upon that section of the community which does not pay direct taxation.

This part of the general question being disposed of, there remains the problem of how best to raise a correspondingly increased amount of national revenue by indirect taxation. This inquiry immediately leads to the recognition of the truth that the basis of indirect taxation is in this country exceptionally and, in the fiscal sense, dangerously narrow. In no other nation are Imperial duties levied on so few commodities and articles of general consumption; while, of course, of municipal customs and excise the country knows nothing. The result of limiting the charge for duty to so small a list of goods is to render it practically impossible to adjust the impost to the need for the money it produces. Consequently, in practice, these few articles are habitually taxed up to the limit of their productive capacity; so that their yield to the National Treasury does not depend so much upon the rate of the impost as upon the consuming capacity of the purchasers. Thus a narrow Customs and Excise cannot be made to respond effectively to a sudden demand for more revenue. In the opinion of the Government, the time has come for widening the basis of indirect taxation by restoring a duty on sugar, and putting an impost of 1s. per ton upon exported British coal. As to the former there can be no reasonable cavil. Nobody can logically contend that sugar is not as amenable to taxation as tea. The duty formerly levied upon it ought never to have been abolished, as it was, in deference to the silly sentimentalism of the cry for a "Free Breakfast Table," which never had the smallest justification in common sense.

With regard to the export duty on British coal, we find ourselves in the pleasing position of witnessing the realization of a notion long ago ventilated and advocated in these columns. Of course, the coal trade will cry out against the duty; but then the coal trade has not done anything of late to win the respect and confidence of the country. Quite otherwise, indeed. There is a good deal of the "wisdom of "the serpent" in setting off a sugar tax with an export coal duty; because the arguments of the scholastic economists as to who will pay the money in each case counteract one another. If the consumer eventually pays the tax upon sugar, so he will in regard to coal; and, being a foreigner in the latter case, his loss will be our gain. Frankly, we think that the export coal duty is an excellent tax, and only regret it was not made much heavier. The foreigner will pay it. European nations want our good steam and gas coals so badly that, as was made manifest last winter, the price is literally of no object to them. At a time when the quotations for Durham gas coal were being tentatively pushed upwards, foreign buyers rushed in and bought at anything that was asked, for fear lest, if they waited too long, they might not get any of the coal at all. It would really be outrageous if the colliery proprietors and the coal miners, having tyrannized over the whole land for a couple of years, were now to overawe Parliament. We publish elsewhere the text of the part of the Budget Speech relating to coal. The arguments appear to be irresistible. It is all nonsense to pretend that the difference in value between English and any description of European coal is so small that the imposition of 1s. a ton duty on the former will turn the scale in favour of the latter. It would need 10s. per ton to do that. Probably English gas and steam coal would bear a 5s. duty without any difficulty. The worst that would happen then would be a growing exportation of American coal to southern ports, which would be a good thing all round.

On the whole, therefore, we arrive at the conclusion that the proposals of the Chancellor of the Exchequer are good and reasonable, so far as they come within our purview. Perhaps they do not go far enough; but that is another question, which cannot be gone into now. An income-tax of 1s. 2d. in the pound is, doubtless, a "steadier" for many people; but no alternative charge on the present generation of citizens for defraying part of the cost of preserving the Empire, can be suggested. The bulk of the population, who do not pay income-tax, will have a knowledge of the financial aspect of war brought home to them in the shape of dearer sugar. And the foreigner, who likes British coal, will also be asked to drop his shilling into the Chancellor's hat. It will not hurt him, and will help us. If, whenever the essentially peaceful British Empire is driven into war by the machinations of some foreigners, foolishly relying on the jealousy and the animosity of others, the whole expenses of the operations could be recovered from these outsiders, it would be so much the better for the peace of the world. Although these two fresh taxes are the immediate consequence of the country being at war, it would be a mistake to imagine that they are likely to be temporary, or that they would be rendered unnecessary if peace were to be proclaimed all over the world to-morrow. Their proceeds, and more, will be wanted to help defray the cost of carrying on the British Empire, until such time as the great Colonies shall be able to protect, as well as govern, themselves. It is the income-tax, if any, which will alter in amount with the necessities of the times; and it will be some years before this burden will fall below the level from which it has just been, let us hope only temporarily, raised for the best of all possible reasons—necessity.

Nemesis.

THE coalowners of Great Britain are not, as a body, so smiling and cheerful to-day as they were a short year since. For some months past they have been undoubtedly experiencing inwardly a sense of considerable uneasiness as to the outlook in the coal trade; and, while doing a good deal of earnest whistling to keep up their courage, they have seen with apprehension the effect upon the business of this and other countries of the extremely high prices which circumstances enabled them for a season to obtain from their customers. That season of rollicking prosperity—during which many of the owners displayed a want of ordinary consideration for their customers, and a cool disregard of contract obligations, which will not easily be forgiven them—has been speedily followed by the reaction that inevitably succeeds excess; so that to-day finds the coal trade face to face with more than one cause of serious anxiety.

The rapid fall in prices, while naturally unwelcome, is not the most serious of these causes; for it was certain that top prices could not last indefinitely, though many owners hoped to keep to them longer. It is in the attitude of the miners that the most serious trouble is to be discerned, unless the third source of anxiety be considered by the trade to be the worst. We mean the imposition of the export duty of 1s.

per ton on all coal shipped for sale to foreign ports. It is the announcement of the impost, and the fury of the trade thereat, which give the title to this article; for if ever effect obviously followed cause, it is to be found here. Had the Chancellor of the Exchequer wanted to raise an additional 40 millions (instead of 11 millions) of taxes this year, we are perfectly certain that the putting of a tax upon coal would never have been seriously considered by him had not the "boom" of last year taken place. We do not, of course, wish to speak as if the coalowners were not justified in reaping benefit from the buoyancy of trade in recent times. Coal was in brisk demand, and a rise in price was inevitable. Where we think the owners were to blame was in quite indiscriminately pressing their advantage to the uttermost—to the immediate damage of their customers (many of whom deserved some show of consideration, at the very least), and to the eventual damage of their own trade. And now they have to face an altogether unexpected state of affairs—they have to pay, or make their foreign customers pay, 1s. to the Customs officials for every ton they sell for consumption "off the premises," except that used by steamers engaged in foreign trade! The only other alternative is to lose some of their foreign business; and that is what they probably will do in a certain measure—to exactly what extent remains to be seen. The result, for the present at any rate, cannot fail to be beneficial to coal buyers in this country.

We have referred to the prospect of labour difficulties. In a sense that also is a just retribution for the past; for there is no doubt that the owners used the increases that they granted in wages as levers for keeping up prices after they should have fallen. It will be remembered that, under the terms of their agreement with the owners, the Federation men were not entitled to any increase in wages last year, beginning the year as they did at the maximum payable under the agreement expiring at the end of 1900. When, however, prices rose so unexpectedly high, the men asked the masters to concede a higher rate, as an act of grace. The masters agreed to give another 15 per cent. on the standard; but, instead of granting the rise at once, when prices were at their highest, the owners split the increase up into three rises of 5 per cent. each—giving one on Oct. 1, another on Jan. 1, and the last on Feb. 1. They were thus in a position, when they ought to have been reducing prices rapidly, so as to enable our manufacturers to keep their shops going, to refuse concessions on the ground that wages had gone up again. This policy has wrought its own defeat, as all dubious policies have a way of doing; and now the masters have to face a determined body of men, with plenty of funds in their banks, who roundly declare they have no intention of going back to the old rates of pay. The relations subsisting between employers and employed will not, moreover, be improved by the readiness with which the former have announced that the burden of the coal tax, if borne in this country, must fall largely upon the shoulders of the men. If gas managers refrain from rubbing their hands and smiling at the reversal of the tables since last April, they are less human than we imagine them to be.

An Awakening for Manchester.

THE Manchester Corporation Gas Department would seem to be passing through a somewhat trying time. It was only the other day that Alderman Gibson, the Chairman of the Gas Committee of the Corporation, made his honourable but futile stand against the raising of the price of gas by 3d. per 1000 feet for the express purpose of enabling the customary subsidy of £50,000 a year to be paid out of the gas "profits" in aid of the rates. Already it is made to appear that the increased indirect taxation of the consumers of Manchester gas to this amount will be insufficient to produce the usual subsidy, and that for the ensuing financial year not more than £11,000 will be forthcoming from this source for t he relief of the rates. This is reported to be the purport of the estimate just prepared by the Gas Committee; and local opinion is waiting to see what the City Council wi,l do in the circumstances. It will, of course, be possible for the Corporation to put up the price of gas again, and to any figure that may be necessary to return the amount of "profit" demanded. That is the beauty of municipal trading. There is no limit to the proportion of "profit" that can be made by the mere passing of a resolution. So happy a state of affairs may well be the envy of the ordinary shopkeeper and small tradesman who cannot, in the bosom of his family, declare in the same way how much he will clear by his business operations of a year ahead. Many a Manchester man may murmur, on hearing of this, "Oh, that I too were a Municipality!" A trader can only turn himself into a limited company. Obviously, something more is desirable.

Naturally, inquiry is made as to why the Gas Department have suffered this shrinkage of resources. The answer is calculated to give pause to those amateurs of Municipalism who are inclined to think that a corporation can ask and have all the subsidy its treasury requires of the gas committee. In the first place, the actual amount of increase put upon the price of gas last year was not enough. Instead of a paltry 3d., it should have been 6d. or 7d. That would have put the revenue account out of danger; but the Corporation were afraid to do it. Timid, time-serving finance is not confined to Westminster. Many a local authority in the land will readily help itself to a threepenny-bit out of the gas consumer's pocket in the hope that he will never miss it, while refraining from taking more through fear of his objecting to the pillage. So in the case of Manchester, the estimates dressed up for the purpose last year showed that, on the bases taken, the extra price would just clear a surplus of £51,900 on the twelve months' trading. Unfortunately for this optimistic anticipation, matters have turned out differently from what was officially expected. Not only has dearer coal made itself more heavily felt, but the growth of the gas consumption has fallen to something under 1 per cent., while labour costs have gone up. It is in the stagnation of the Manchester Corporation gas undertaking, however, as shown in its failure to increase sales, that the key to the financial condition must be sought. This check is attributed to several causes, among which are cited the higher price of the gas, the extensive use of Welsbach burners, and the competition of the untaxed Corporation electricity supply.

Probably these depressing influences are here set out in their correct order of importance. There used to be a pernicious heresy, professed unblushingly by many heads of gas undertakings, that the demand for gas is unaffected by the price. These misguided individuals were in the habit of declaring that, whenever more profit was desired, they should unhesitatingly raise the price of gas, and collect the proceeds. They belonged to the automatic dividend producing brand of administrators, not quite extinct, but everywhere discredited. Whatever the proportion of truth that at one time existed in this heretical doctrine, at an epoch when gas had no rivals worth considering, it has long ceased to possess any such admixture. Nowadays, dear gas simply does not sell, where it can possibly be substituted by anything else. This repugnance to what is regarded as an exorbitantly-priced gas operates most conspicuously with possible users of the supply for heating and the generation of motive power. The manufacturer who is hesitating between a steam and a gas engine, is determined for the former by the announcement that gas is going to be dearer. It is not the actual figure that daunts him, but the fact. Every business man who contemplates making a larger use of gas is very sensitive on this point. He knows that coal varies in price; but then he buys coal in the open market, and if he has cause to complain of one merchant, he can go to another. It is not so with gas. In relying upon gas, a business man feels that he puts himself helplessly in the grip of a monopoly; and if he has any reason to suspect besides that he will be played with, and taxed, to make up for bad management, or to pay somebody else's rates, he will think twice before putting himself into such a position. That is what is the matter in Manchester; and not there only.

With regard to the effect on the output of the growing popularity of incandescent gas lighting, no gas-works administration that is worth anything can be caught napping. Indeed, by their own public lighting policy, and in other ways, a well-directed gas committee will take the lead in thus economizing consumption. As to the competition of corporation electric lighting, this also is a factor that should not be quite an unknown quantity to the Manchester Corporation Gas Committee. They must surely have been prepared for it for years. All these things, taken together, bear but one interpretation, which is that the milch-cow period of corporation gas supply is over, for good. The gas consumers will not stand it any longer; and they need not. The committees may put up the price of gas if they will; but the public will do without gas rather than pay an exorbitant charge. This is the moral of the present Manchester gas situation; and the quicker the Corporation perceive and take it to heart the better. Besides, why should

the Corporation imperil the development of their vast gas property for the sake of a paltry £50,000 a year paid to the city fund? The candle is too costly for the game.

Eastern Counties Managers at Norwich—Mr. Young's 6·4d.

As the warden of the property and business of the British Gaslight and Coke Company in Norwich, Mr. John Young has been so engrossed with their affairs that, in the last few years, he has been seen or heard but little in outer professional circles—much to the regret of his *confrères*. But last Thursday (for the first time in their twelve to thirteen years of existence) the Eastern Counties Gas Managers' Association visited Norwich and Mr. Young, and that gentleman's innate affability and vitality led him into taking practically all the responsibility of the meeting off the shoulders of the President (Mr. J. G. Hawkins) and the Committee of the Association. Mr. Young received the members, and looked after their comfort, provided the technical part of the programme, and, to wind up the day, his Company (who were represented from headquarters by Mr. H. B. Chamberlain) entertained the Association, in a very generous manner, at dinner. Needless to say, profit and satisfaction issued from the day's events.

To the paper which he contributed to the proceedings, Mr. Young gave the title "Hints on Selling Gas;" and one of the surprising things about it was to find (if we may use a little incongruity in expression) that there was so much that was new to be said on a topic that has become old by constant treatment. But let it be said that it is not within the power of every man to clothe such a topic with so much interest as Mr. Young has proved himself capable of doing. There are only two points in the paper which we are about to notice in order to emphasize them. The first refers to the "JOURNAL," into the earlier volumes of which Mr. Young has been dipping. He calls attention to the fact that the then occupant of the editorial chair (who was gifted, far seeing, and revered by his contemporaries) tendered advice, over half a century ago, on this subject of selling gas; but that half century was allowed to nearly spend itself before any really serious steps were taken in the directions which he indicated as necessary to make gas the "universal light." After duly perusing Mr. Young's quotations from the first volume of the "JOURNAL," let each reader inquire of himself whether the electric light would have obtained the footing it has in this country, or whether the oil-lamp would so long have retained its place in the poorer class of households, if the counsel of fifty years ago had been earlier acted upon. We have confidence as to the nature of the answer. As, however, it is no use crying over what has been left undone in the past, the second point to which we wish to allude is of more importance to-day. In the fifth paragraph from the end of the paper, Mr. Young shows how increasing the consumption of gas in Norwich has reduced the costs of manufacture (excluding raw material) and standing charges per 1000 cubic feet of gas sold by the magnificent amount of 6·4d.! Mark well the figure, and the lesson. Many there may be who can show similar results; many more there are who cannot; and many again whose situation would not permit the scope for showing so high an advantage, but who could anyway secure it in part. If that 6·4d. does not spur many more—directors and committeemen as well as managers—into increased activity in promoting the consumption of gas, then they are hopeless for their positions in the present day; and the sooner they give place to others who are willing to throw persistent and liberal energy into the work, the better for their undertakings. The reader does not require any assistance from us in his reflections on that 6·4d. in relation to the price of gas. The increase in day consumption particularly, results in a greater return on the capital expenditure and standing charges; the greater return (if the cost of raw material does not act as a deterrent) enables a reduction to be made in the price of gas; and the reduction in the price of gas further expands and consolidates the business. Then emulate Mr. Young; and, if possible, excel his 6·4d.

Through Mr. Young's instrumentality, a second contribution of great interest was made to the proceedings. It was by that gentleman's assistant (Mr. Philip G. G. Moon, F.C.S.), and was on the current subject of "Arsenic in Coke." The communication recorded the results of tests for arsenic in coal, coke, and partly carbonized charges; and it derives additional importance from the fact that it is really the first specific publication that has been made of such tests carried out in connection with a gas-works. It reveals, in a pronounced form, the falseness of the allegations which have been made against gas coke as a fit and proper agent in the process of malting; and such evidence as Mr. Moon has here given should assist in re-establishing this gas-works product in the affections of the maltster.

In connection with the election of officers for the ensuing year, the choice of the members fell upon Mr. R. Brown, of Cambridge, to succeed Mr. Hawkins in the presidential chair; and Mr. E. W. Smith, of Chelmsford, follows Mr. Brown in the vice-presidency. As constant attendants at meetings and good servants, both gentlemen have won the regard of their fellow-members, and will receive their encouragement and aid in steering the work of the Association into the proper channels during, we trust, the coming two years.

Societe Technique du Gaz Meeting.

As previously mentioned in the "JOURNAL," the annual meeting of the French Gas Society will take place at Dieppe in July, commencing on the 18th of that month, instead of the 17th, as previously announced. The preliminary programme has just been issued to members. The first day will be taken up with the reading of the reports and technical papers, followed in the evening by the annual banquet. The next day, the remaining papers will be read, after which MM. Eugène Lebon et Cie. (Compagnie Centrale du Gaz) will give receptions. It has been thought that some of the members of the Société Technique du Gaz would like to take advantage of the meeting being held at Dieppe to visit (if permission be granted) some gas-works in England; and it is proposed to leave Dieppe on Sunday, July 21, for London—resting at Brighton *en route*. After a brief stay on this side of the Channel, the return journey will be started from London on the evening of Wednesday, July 24. We need hardly add the pleasure it will give to gas engineers in England to extend their utmost courtesy and hospitality to their French colleagues. Mention is also made, in the preliminary programme referred to, of the Gas and Water Exhibition to be held at Vienna from June 17 to 19 of this year, and further, of the International Engineering Congress at the Glasgow Exhibition, for the Gas Section of which papers to be read are requested.

The Increasing Perils of Civilized Life.

IT is a truism that as the comforts and conveniences of civilization increase and multiply, so they bring with them fresh perils to the individual. Yet it is a truism which it is well for everybody to keep in constant remembrance, lest he too should be overtaken by some one of its protean exemplifications. For much as we all delight in pointing a moral and adorning a tale, we naturally and excusably entertain a rooted objection to supplying in our own persons objects for other people's edifying stories illustrating the dangers of every-day life. And when a man who may have fancied himself wise and prudent chances to fall into one of civilization's many pitfalls, the subsequent proceedings are apt to interest him no more. It was our sad task last week to record two more deaths from the commonly-distributed gas-heated bath, which was not, in this instance, shut up in a small box-room. Candidly, these gas bath-heaters are calculated to give much painful thought to gas engineers. There must be many of them in daily use which have seen much service; and what their condition is one would rather leave unsurmised. Considering, moreover, by whom they are used, the wonder is that the death-rate is not more seriously swollen by this agency. Of course, taking the mortality returns as a whole, it appears that the advance of civilization makes for longevity. But nevertheless there is at work under the smiling surface of these figures a terrible machinery for the elimination of the foolish, the careless, the ignorant, the helpless, the young. Gas, electricity, lamp oil, carbolic acid, cheap celluloid manufactures in the form of clothing and toilet requisites—all these and a good many more gains of civilization (useful servants when properly used), avenge themselves horribly if maltreated.

Mankind has great difficulty in keeping an adequate watch over these risks. It is a besetting weakness of the human intelligence to take alarm at the wrong things, and to make a great fuss over hazards which are really quite otherwise than they are represented to be. Thus the London County Council are hammering away at the stale old grievance of the flash-point of burning oil, right in the face of all the overwhelming evidence that this particular agitation is factitious, that its premisses are baseless, and its objects impossible. Just in the same way the County Council are toying

with the portable photometer, heedless of the "writing on "the wall" in the last South Metropolitan Act. Why do not the London County Council take a thought, and, looking at the London gas supply as a whole, consult with the Gas Companies as to how it can be cheapened and made of more service to the people? Why? Because to do so would be a common-sense proceeding, pandering to no prejudices, and subserving no secret and ulterior motive.

It always jars upon our technical nerves to see gas cooking-stoves advertised as being so simple that "a child can "manage them." Pictures are circulated of little people in pinafores, hovering by gas-stoves almost as tall as themselves. One shudders at the possibilities of the realization of these pictures—the gas-oven burners clumsily lit by weak fingers, the small hands mistaking taps, the clothes blown against the flames, the kettles of boiling water pulled over. It is doubtless true enough that the phrase "a child might "manage it" is applicable to many kitchen arrangements, gas-cookers included; but that is not to say that children ought to do anything of the kind, save under immediate and competent supervision. Although it may appear rather like a digression, we desire to mention here, and to strongly support, the caution that has been recently given by the Medical Press respecting the increasing use for children and adults of "flannelette" underwear. It cannot be made too widely known that this is a variety of gun-cotton, so to speak, which will catch alight very readily, flame up fiercely, and stick to the skin until reduced to ashes. The mischief is that the material which it usually supplants (flannel) will only burn with difficulty, and will not easily take fire from a spark of coal or at a gaslight. Users of the newer fabric are therefore not on their guard. Nobody should use flannelette, nor any variety of celluloid articles, without clearly realizing that a gaslight heedlessly approached, or a hot cinder, may mean death or disfigurement for life. Notices of the inflammable nature of this material ought to be prominently posted up wherever it is on sale.

It is a great temptation to bring these observations to a "topical" conclusion with some remarks on one of the latest of the dangers of civilization—arsenious coke. We cannot for the present, however, do more than echo the call for information of Mr. F. E. Cooper, the Secretary of the Gas Companies' Protection Association, published in last week's "JOURNAL." This is a matter that touches closely all gas undertakings, and especially those of the North of England, where arsenical beer poisoning has been endemic; so that it is to be hoped that gas managers possessing the required information will not hesitate to communicate with Mr. Cooper, even if they are connected with works belonging to local authorities. The evil to be combated is a common peril. Hitherto, absolutely nothing has been suspected in regard to the safety of coke as a fuel for maltsters' and every other use. If it should be proved that the mineral impurities of some coals remain in the coke resulting from their carbonization, and are capable of producing noxious effects in after use, the matter can and must be at once dealt with in the obvious manner.

Words and Phrases.

THERE has been a distinctly "acid" little controversy—as befitted the medium—in a chemical contemporary, over the very latest of American "fads" in spelling, which, though only a few years old, is already decadent. We allude to the attempt of some "authorities" in American chemical science to impose on their public a system of spelling the names of the elements and their chemical compounds, in which sulphur became "sulfur," and the final "e" was dropped from "oxide," and so on. This notable effort dates from some years back; and although it was at once enthusiastically adopted by a few technical publications on account of its being "so American!" the fashion never had any real life in it. Now all the best United States technical periodicals spell English as nearly like the English do as their ancient Webster will let them. It is very remarkable that a nation of such wilful slovenliness and carelessness in the use of words, should be led by the nose by its pedants in the matter of so-called systematic spelling. Of course, Websterian spelling is no more logical than is the best English practice; while it is distinctly irritating and disturbing to thought. But English readers of American printed books and papers would not so much object to the fantastic spelling of fibre as "fiber," and so forth, in obedience to the ancient sage who held that no English word should end with "re"—goodness only knows why—if they could only feel sure that the meaning of the words was as solicitously guarded as the spelling. Unhappily, neither the sense of the word nor the construction of the sentence or "saying," is sufficiently regarded.

Thus, we come across in a serious periodical the following clumsy statement about Matter. The writer tells his readers, that: "The endeavours to define Matter at the present day "are too many to count; but as they are confessed failures, "the outcome is a forcible reminder that the real nature of "Matter is insoluble." The style of this passage could hardly be worse; and the writer actually succeeds in flatly contradicting himself without knowing it. Wishing to say that the real nature of Matter is not known, and cannot be known, he declares that it is "insoluble," which is what was to have been demonstrated. Without being quite so bad as this, many writers of the present day, in England as well as in America, possess some annoying tricks of incorrect expression. Thus, the average newspaper reporter seems never to have seen a real president of a society or chairman of a meeting. He only knows that somebody "acted as" president or chairman. He is getting laughed out of calling fire "the devouring element;" but when his investigations do not lead him to any fresh discovery, he declares that "inquiry "did not develop any new facts." Why should it? Facts, like photographs, develop of themselves, in a suitable medium. It seems almost vain to protest against the careless use of "phenomenal" to mean exceptional, extraordinary. Yet no one who has ever dipped, however slightly, into Philosophy can reconcile himself to this common misuse of a word which properly refers to something that "appears," as distinguished from the thing that is. Transpire is another overworked word. Nowadays, it is made to mean "occur," or "take place." Really, it means "to leak out." A good many things happen without transpiring. There was a curious little correspondence recently in the "Standard" over the change that has taken place in the popular sense of the word "lurid." It really means ghastly pale; but it is usually given quite the opposite significance. The critic who refers to a leading article in a newspaper, or a politician's speech, as "lurid" does not mean that the style is bloodless. This is a modern instance of the process of inversion of meaning, of which the word "prevent" is the classical example.

ESSAYS AND REVIEWS.

PARIS GAS CONGRESS REFLECTIONS.

THE recent publication of the "Minutes of Proceedings" of last year's International Gas Congress (which was noticed in an "Editorial" in the "JOURNAL" for the 2nd inst.), together with the preliminary announcement of the programme of the forthcoming Engineering Conference at Glasgow, combine to make the present time a suitable one for a general consideration of the lessons to be learnt from, and of the technical value of, such meetings.

As already lamented in the "JOURNAL" which appeared immediately after the conclusion of the Paris Congress,* the position held therein by the representatives of the British gas industry was somewhat humiliating. Out of the twenty-nine papers contributed to the proceedings, only two were written by Englishmen, who, moreover, were themselves connected with Continental gas undertakings. As a contrast to what is done by the great London Gas Companies in similar situations, the Paris Gas Company were represented by three papers, of which one at least was a scientific treatise of considerable importance. There were eight other papers of varying merit contributed by members of the French Society. Germany was represented by no less than seven, and America by four; the remainder being made up by other countries. Thus in mere point of numbers there was anything but satisfaction to be derived from the representation of a country, which, in the words of one of our Presidents, was the "nursery and boarding-school" of the gas industry. Nor from a perusal of the papers reprinted in the volume of "Transactions" is the situation modified, or ameliorated by a closer examination of the matter contained therein, than was possible in the hurry and excitement of the meetings themselves. The English contributions, though of adequate merit, dealt merely with recognized constructional problems; and for papers of chemical interest, of scientific investigation, and of physical research, one has to turn to those prepared by Continental engineers. If the past Congress, therefore, may be taken as any guide to the present character and actual vitality shown by the followers of the industry in the different countries, what is wanted in our own case may easily be

* See "JOURNAL," Vol. LXXVI., p. 623.

inferred. It is not our place here to examine the causes of things being as they are, or to suggest remedies. But it may be said that the former range from our national character, through the original growth of the industry, and the equipment of its administrators, to the organization of its representative societies. With regard to the remedies, a commencement is being made, in one particular, in the free discussion of questions relating to improved technical education for the rising generation of gas engineers, and in a general awakening to the problems connected with it.

Young men of to-day must be encouraged to offer of their very best. They must be helped to bring fresh life into old problems, and be assisted, instead of hindered, in their original endeavours. A spirit of confraternity, now sadly lacking, should be fostered; and every inducement—financial and otherwise—should be proffered them. At present, a young gas engineer, who has struggled to pick up some crumbs of learning in the haphazard way offered him in workshop or office, finds himself but a drifting unit among a host of others. With luck, he reaches a more or less retired haven of peaceful commonplace routine in a provincial gas-works—the envy of his struggling competitors. He manages well; investigates nothing—lacking his youthful enthusiasm; receives a paltry pension; and earns the thanks of his Committee or Directors. With the will to do great things, he lacked the opportunity. With the opportunity to do them, he lacked the will. This must be changed. The opportunity must be given to men in their prime, men of energy and resource; and then only will the stigma of want of enterprise in the higher walks of the gas industry (in those very things that raise it from a business occupation to an engineering science) be removed.

Another thing demonstrated by the Gas Congress was the need of a practical working knowledge of an additional language to one's own. French is the diplomatic language of the world, and is likely to remain so; and it is therefore the most generally useful one to be acquired. For a gas engineer, however, to be fully equipped in the developments of chemical science bearing upon his speciality, a knowledge of German would be of great utility. Perhaps it is not requiring too much from the would-be leaders of gas engineering later in the present century, to have an adequate acquaintance with both these tongues. That such accomplishments only require effort and application—in neither of which Englishmen are supposed to be deficient—is shown by the fact that on the Continent of Europe many young men in subordinate positions on gas-works may be found to converse sufficiently fluently in a couple of languages beside their own.

The language difficulty is unavoidably a great one in the management of International Congresses, and one that reduces their value and effect. Though piecemeal verbal translation by thoroughly competent interpreters is one solution of the difficulty, and was partially tried at the Paris Congress with some small success, yet it is hardly an altogether satisfactory method of procedure. Perhaps if the foreign speeches could be kept within still narrower compass than is usually advisable, and afterwards their gist freely put into the language of the Congress, the result would be as good a one as can be arrived at, until the far-off dawn of the Universal language. Another item may also be mentioned in this connection, and that is the advisability of arranging that the different speeches of any one language should be made consecutively. By so doing much confusion and the impression of a Babel of tongues are avoided, while time is saved, and clearness facilitated.

Papers to be read should, as a rule, be able to be described as "short and sharp," and should deal, generally, with subjects that lend themselves to the recounting of varying experiences; or they should be cast in such a form as to make easy the exchange of views. Of course, it is not intended by this that treatises of an abstract nature, and theses on scientific or other problems, primarily suited for the study, should be altogether excluded. A perfect Gas Congress would include examples of the different classes of papers in proper proportion, so that there might be food for all, and, at the same time, furthering the best interests, both theoretical and practical, of the industry.

There are other points in the conduct of Congress meetings that will suggest themselves. One useful suggestion, applicable to all technical assemblies, was that lately made in the "JOURNAL"* —namely, that participators in any debate should take a proper stand in a suitable position facing the audience. This is more particularly of value in an assembly of mixed nationalities, where the interest in many cases can only be sustained by the sense of sight, instead of by both that and of hearing and understanding. Further, the name of the speaker should be made properly known to all in the room, if needs be, even by the use of chalk and blackboard. Nothing is more irritating than to have one-half of the meeting asking the other half who it is that is addressing it. Ample rules should also be made fully known with reference to the conduct of debate, a time-limit fixed, and, where possible, names should be given to the Chairman beforehand. The latter's position is not by any means an enviable one in an international assembly; but much can be done, as always, by the exercise of tact and consideration.

Again, there are many men who might make valuable additions to a debate, and yet withhold from nervous fears or language difficulties. Such men should be given every opportunity of expressing their views in writing, in a limited number of words, for the printed "Transactions" of the Congress. Further, it often happens that some really valuable experiences, or facts and figures, are brought out in discussion, and are as soon lost sight of, buried in a mass of verbiage. It is sometimes the habit of the Chairman to sum up the salient features of the discussion, and to collect the threads of useful but wandering arguments. By so doing, future inquirers into the subject of the proceedings are guided into correct paths, and the educational effect of the debate is largely enhanced. Where, however, it is not possible for this summary to be verbally accomplished at the time, it might appear that much good would accrue from a judicial reviewing of the proceedings, and from a proper gleaning of the facts brought out, if done for the published volume by a really qualified hand, or by a Committee.

One word more, on the importance of the prompt publication of the proceedings, as soon as possible after the closing of the Congress. The published volume is greatly increased in value by so doing; and its utility as a work of technical reference is largely augmented by an early familiarity with it, when the events and experiences recorded are fresh in mind. We have already marked our appreciation of the quickness and manner in which the Société Technique de l'Industrie du Gaz en France translated, arranged, and published the records of last year's International Gas Congress. In this exceptionally difficult task, they have put to shame some of our own Gas Societies, with a far simpler and easier part to play.

Leaving now, however, on one side these details that have been jotted down as they have occurred to mind, what is the total technical effect of such Congresses? It is equally easy to over-estimate, as to under-rate, their value. In this respect they are in very much the same position as the International Exhibitions themselves, in connection with which they are usually held. The latter have been trumpeted forth as the herald of international peace; and they have been also stigmatized as the forerunner of national industrial ruin. Needless to say, neither the one nor the other interpretation is the correct one, though the first is less outside the truth than the second. By promoting international intercourse, by fostering international acquaintance, by scattering national prejudices, and by breaking down national barriers, the path of peace is made easier. So it is with International Gas and Engineering Congresses. They open closed doors, they shame narrownesses, they extend knowledge, and they breed sympathy and respect. For these reasons, therefore—none the less strong because of the difficulty, if not impossibility, of expressing them in terms of current coinage—are our thanks on this side of the Channel due to our colleagues on the other, for having initiated, and so successfully carried through, the first International Gas Congress. And though their actual labour is finished by the publication of the volume that has suggested these few thoughts, yet the unseen spirit of their work continues.

It is, of course, not intended, nor as yet to be attempted, to repeat or to carry out on the same scale at Glasgow, in September next, the Paris Congress of the same month of last year. The former is to be primarily an International Engineering Congress, and incidentally, in one of its eight sections, a Gas Congress. Be this as it is, with the recognized head of the British gas profession in the chair, and aided by an able and energetic Secretary, besides others, there will, without doubt, be a loyal endeavour to make the International Gas Section as worthy as possible. And as the first announcements with regard to it have already been received by members of Continental gas societies, this early opportunity may be taken of assuring them of our heartiest greetings, and most friendly endeavours for their comfort and enjoyment.

THE NEED OF A DESIRE FOR KNOWLEDGE.

On the several occasions on which we have discussed in these columns the question of education in relation to industrial and commercial life, and argued in favour of a more complete and better ordered training of the younger members of every profession, and of those who have not yet reached the stage of choosing a profession, it was pointed out, as a fundamental difficulty in the path of educational reform, the indifference of Englishmen generally to intellectual pursuits, to knowledge for its own sake—their lack of appreciation of the true value of learning. That obviously constitutes a very real obstacle to progress; for if there be no genuine demand for fuller education on the part of those whom we are anxious should learn, the provision of the means for obtaining that fuller education will not carry us far. One of the surest methods by which the demand may be created, is by the attachment to education of a higher commercial value than it at present possesses—that is to say, by employers requiring of candidates for employment proof of the possession of a better training, a sounder education, than is now required of them. But it is first of all necessary to persuade employers as to the greater value to them of better educated servants. For the removal of these difficulties to educational progress no specific can be prescribed; it can only be achieved by the gradual enlightenment (through experience and the persistent propagation of the truth) of employers, of parents, and of aspirants to success.

With the desirability present in our mind of the frequent proclamation of the need for better education to as wide an audience as possible by voices to which the public ear is open, we have read, with both satisfaction and regret, a paper from the pen of the

* See "JOURNAL," Vol. LXXVII., p. 258.

late Bishop of London in the current issue of the "Contemporary Review," entitled "A Plea for Knowledge." The satisfaction arises from the subject-matter of the paper; the regret is due to the fact that owing to the death of its author, it has had to be published in the comparative obscurity of a monthly review (we do not speak slightingly of those periodicals, far from it; we mean that they reach only a select audience, not the "man in the street") instead of being delivered, as it was prepared, as an address to the Midland Institute at Worcester—in connection, evidently, with the foundation of the University of Birmingham—and reported in the daily papers. As would be expected by all who were acquainted with the intellectual breadth, the profound knowledge of men, and the independence of mind of Dr. Creighton, the observations upon the educational needs of this country which are now given to us are luminous and instructive to a high degree.

The main thesis of the paper is that which, as has been said, has been on more than one occasion advanced in the pages of the "JOURNAL." Dr. Creighton wrote—

> To put it briefly, my opinion is that the great defect of England at present is an inadequate conception of the value of knowledge in itself, and of its importance for the national life. I wish to see this remedied; but it cannot be remedied till it is recognized. It will not be amended by improvements in our educational system; for systems are only so much mechanism, and depend on the force which works them. If there is a desire for knowledge, it is not difficult to find proper means of imparting it. If there is little effective desire for knowledge, the invention of easy means for imparting a beggarly minimum will check rather than promote the desire. . . . What I mean is that the average Englishman thinks very little of the importance of gaining for himself as much knowledge as he can for the purposes of leading his own life efficiently.

The qualities upon which the Englishman, and his rivals, the German and the American, respectively pride themselves, were next set out by the acute observer whose words we have quoted. The Englishman's favourite qualities are all practical, rather than intellectual—vigour, energy, practical capacity, dogged perseverance, the determination never to be beaten, integrity, a love of justice, outspokenness, straightforwardness, and so forth; the German's, both intellectual and practical. "The average German would put knowledge and assiduous application in the forefront of the national qualities of which he was proud. His attitude towards life would be that knowledge was first necessary to show you what you could best do; then that the constant application of that knowledge, and its assiduous increase, would lead you to such success as you deserved." The American's ideal is "a clear recognition of all the resources necessary for success, and persistent versatility in using each of them to the full at the right moment."

The English view makes the least appeal to the intellectual qualities. Well, what of that, some may say. We have done uncommonly well by reason of those qualities, what need of anything more? The answer is put in a nutshell: "What can be done simply by the insight which comes from practical capacity has nearly been done. . . . The methods of common sense ought to lead on to the methods of science. For common sense means doing what is immediately obvious; science rests on the cultivation of the powers of observation beyond what is immediately obvious." That puts in better language what we urged some time since—that the need of more thorough and extended education has arisen from the fact that the man who wants to progress to-day has to learn, as the commonplaces of science, facts the discovery of which formed the lifework of antecedent men of genius.

Dr. Creighton foresaw that our industrial position would require more strenuous efforts for its maintenance in the future than in the past. "We must be prepared to add to our store of capacity; and I see no way to add to it except by increasing our knowledge. Let us do all we have done; let us keep our existing qualities; but let us add to them that which increasing knowledge can bring." But it is not merely the scientific investigator that we need; not only the inventor and discoverer. We want also "the employer who is quick to perceive and apply what has been discovered"—that is where the American so especially excels—"and the workman who can so far understand its utility as to wish it to have the best possible chance." That is not the least difficult of attainment—the workman who will give labour-saving appliances the best possible chance. The general public fail, unfortunately, to see all this.

Those members of the community who have taken interest in education have, many of them, concerned themselves only with the mechanism of education. "with administration, with sectarian rivalries, not with the only question with which education is concerned—*the best mode of fitting a child for the duties of life*." Dr. Creighton had some harsh things to say of this general indifference to, or misdirected interest in, the question of education. Parents in particular come in for some rough handling, in all too many cases thoroughly well deserved.

> I should like to see some traces of a conscious desire on the part of parents that their children should have the best intellectual training possible—better and fuller than that which fell to their own lot. . . . I do not know that parents of any class impress on their children the absolute need of gaining knowledge for the life which lies before them. They regard other qualities as more important. . . . Without depreciating intellectual attainment if it comes, they rarely put it in the first place—unless a boy's career is to be determined by success in a definite examination. Masters of public schools will tell you that, generally speaking, only the sons of poor professional men, who propose to follow in their father's footsteps, and know that they must of necessity make their own way in the world—only those boys work hard.

We must not quote further from a paper which is no string of commonplaces, of arid platitudes. It is a contribution to the discussion of a difficult question by a man who never talked without thinking, nor without inducing thought in his hearers; and such men are rare. Its perusal adds to one's regret that the author is no longer exercising in our midst the influence of his common sense, his learning, and his wisdom. Those who have any interest in the problem of education should not fail to read the whole of this never-delivered address.

ELECTRIC LIGHTING MEMORANDA.

The Electricity Supply Undertakings of the Metropolitan Boroughs—The Case of Islington—Falsified Expectations—Bitter Disillusionment.

IT is an article of faith with all amateurs of municipalized electricity supply, that the large Metropolitan boroughs that have ventured into this kind of business are doing very well by it. This general impression is not quite general in the localities chiefly concerned. In the particular case of the borough of Islington, for example, there is a not uninfluential party of the Council who are dissatisfied with the failure of the electricity supply undertaking to prove remunerative. A special report on the circumstances of the undertaking was called for so long ago as Dec. 7 last—that is to say, very soon after the Borough Council succeeded to the property and obligations of the old Vestry. It would be well if the proceeding were copied by the other Metropolitan councils. In the Islington case, the special report has at length been presented, as mentioned in our "Electric Lighting Notes" last week. It starts with the cheering statement that the electrical works of the Metropolitan boroughs of St. Pancras, Shoreditch, Hampstead, and Hammersmith had been visited by the Islington Committee, and found not to bear comparison with the works of Islington, either as regards the durability of the buildings or the quality of the machinery. Pleasant, this, for the authorities in question! They will doubtless be glad to see a visiting deputation from Islington again.

When it comes to the question why the Islington undertaking does not pay, the answer officially given is that it has but a small output and a large expenditure in capital and wages. "No trade," is the adequate explanation; but it is not the only one. It appears that Islington devotes practically 50 per cent. of the output of its electricity works to street lighting. This is rightly acknowledged to be the least profitable of all branches of an electricity supply business. But it is not at the same time admitted, as it should have been, that even so it is the ratepayers who pay the heavy bill for this service, which is very dear and not remunerative. The report furnishes one more proof, if such were needed, that if a municipal electric lighting undertaking has to be bolstered up by a big street lighting connection, paid for at any price, it is not worth carrying on. Indeed, it may be taken as axiomatic that the smaller the dependence of the undertaking on street lighting, the greater its prosperity. But this is not the whole trouble of Islington. The failure of the private lighting branch is now attributed to the circumstance that the supply has been restricted to the more important business centres of the borough. Very proper too, one would think; but the startling discovery has been made that these centres are not only scattered and at wide intervals, but their hours of consumption are limited during the winter months to an average of four or five hours a night, and in the summer to probably one or two hours.

This condition of affairs might have been anticipated without stretching intelligent perception into the region of prophetic insight. It does not appear to have been suspected until the job was done, when it turned out that during the greater part of every 24 hours much costly plant and machinery had to lie idle and produce no return; while the remainder, which did the street lighting, was not earning its running expenses. What a high quality of forethought must have gone to the hatching of this elegant means of dissipating the ratepayers' money! Then, the capital sunk in the venture was heavy, because the cost of land required for the central station assumed to be necessary was great. The expense of extending the site is greater still, as is usual in such cases; because not enough was taken in the first place, and now houses have to be acquired and pulled down whenever more room is wanted. More evidence of forethought! There was plenty of provision made for the future in other respects. "There are two chimney stacks of sufficient capacity to take all the power required for many years." Moreover, everything about the works and distribution system is of the very best, which is undoubtedly as it should be; but this extreme solicitude to have nothing but the highest class work and materials makes a poor showing when the trade is not forthcoming to support it. And notwithstanding this high-class engineering, the usual result of an intelligent expenditure of capital on plant—low working expenses—is not realized at Islington. Labour charges are extravagantly high for the amount of work done. The report admits that "the question of wages is one that presents many difficulties;" but it does not pretend to remove them. Hampstead does more work at less than half the wages costs of Islington, for some unexplained reason.

Apart from all details, however, it is the conclusions of the

Committee's report that will open the eyes of amateurs of municipalism in electricity supply. So far as the hope goes of Islington being able to make both ends meet, which has been disappointed owing to the unsatisfactory character of the district already mentioned, the ratepayers must take such comfort as they can find in the admission that some of the recent extensions of mains cannot prove remunerative for a long time, although the others may possibly do so in a few years. But what of that? Is the gathering of filthy lucre to be the proper measure of the expediency of municipal trading enterprise? Perish the base thought. Here is the opinion of the Islington Electricity Supply Committee on the point: "We would not, however, have it go forth as the view of the Committee that the object of the electric light installation belonging to Islington should be mainly one of profit. We believe that the sanitary and even the moral effect of securing a brilliant, wholesome, and cleanly illuminant for the streets and for the private use of the residents in the borough is worthy of consideration by a public body altogether apart from profit; and *it is on these considerations we think the Council must base their justification as electric light undertakers.*" Thus the Committee "give their show away." If this grandiloquent verbiage does not cover up an admission that the borough electricity supply undertaking will never be anything else than a burden upon the rates, it is utterly meaningless. Of course, the electric light is not less "brilliant, wholesome, and cleanly" when supplied without cost to the rates as when it is a municipal luxury. The report has passed the Borough Council, who are indeed helpless in the matter; but it seems to have been the general feeling of the members that the "justification" offered by their Committee was not identical with the expectation which led their predecessors to go into the business.

THE USES OF ADVERTISEMENT.

Now that gas companies have so far realized the truth of the competitive character of their business as to abandon the old dignified pose which required customers to go to them, instead of their looking up custom like an ordinary tradesman, it is by no means uncommon for local newspapers to receive advertisements from the gas company's office. It very often happens, however, that when an old-established house of business so far consents to the sacrifice of its sense of dignity as to indulge, like up-start houses, in advertising, it compounds for the indignity by doing it very badly. In the circumstances, therefore, it is scarcely to be wondered at that many a gas company which has ventured into the advertisement columns of a newspaper circulating in the neighbourhood where it does business, has retired into its shell again after a brief experience of an unremunerative experiment, the conditions of which were never such as to offer much hope of a successful issue.

In the columns of the "JOURNAL," a lively description has recently appeared of the manner in which this sort of thing is commonly done in America. If there is one thing more firmly established than another, in the wide scope of that kind of journalism which pays for publicity—the ordinary contents of advertisement columns—it is that what suits American taste in this regard will not please in England. The proper way to advertise in an English periodical or newspaper is an art which may be acquired, but must also in a degree be innate. It is an art that may be profitably studied by such potential advertisers as the business managers of gas companies—if there are such officers. One is sometimes tempted to suspect that the mere man of business, with whom adequate advertisement is as the breath of life to trade, has no place beside the engineer and the secretary in the hierarchy of a British gas company.

The practice of trade advertisement depends upon the fundamental truth that mankind are an "absent-minded" folk, who really cannot be relied upon to bear the deserving tradesman and his wares as constantly in mind as their merits naturally deserve. That is the sum and the substance of the whole matter. In an ideal community, of course, advertisement would be a sheer waste of effort, and would consequently be dropped. If the citizen were taught from his youth up that, in order to get a particular necessary of life, he must go or send to Department B, of the Universal Stores, it would clearly be useless to trouble him with any further recommendation in this regard. As life is at present ruled, several plausible dealers in this particular commodity thrust themselves and their specialities upon the possible purchasers' notice—a foolish practice, perhaps, in the eyes of the austere philosopher. But what would Vanity Fair be like without the insistent "Buy, buy!" of the salesman? Even the philosophers would hardly care to walk the alleys of a dumb market place.

There is a good method, therefore, in advertisement, which it will pay even an austerely respectable gas company to study and follow. There was a sensible article on "Profitable Advertising" in a recent number of the "Ironmonger," from which we venture to borrow a few hints. The first of these is to adjust trade advertisements to the nature of the competition which has to be met. Monopolies, of course, do not advertise. Can one possibly conceive a satisfactory advertisement of French Government matches? In the case of a competition, however, direct or indirect, the first rule of advertising is never to mention the competitor by name or attribute. His existence is never to be recognized in any way; while the sharpest watch is to be kept upon his doings. This is why we recently protested against the use of the trade name "Arc" lantern in connection with incandescent gas-lamps. It is dead against the first principles of profitable advertising. Imitation is the sincerest form of flattery, and the tradesman must avoid it.

In the second place, advertisement once begun must be kept up without cessation, and always corrected to date. We have seen gas company's advertisements in the same place in the local newspaper year after year, with blank spaces where the prices of coke and other commodities should be. This is not business. If the thing is worth doing at all, it is worth doing properly. It is a valuable privilege to be able to address the public from the same "pitch" day after day, or week after week; but if the goods in the window, or the show card, are never changed, the public will pass by with glance averted. Knowledge of business on the part of every assistant or attendant in a business establishment pays. Every gas company's employee who is likely to come into contact with the gas-consuming public ought either to be able to answer intelligently all questions about burners, stoves, coke, &c., addressed to him, or be able to direct the inquirer to the proper quarter for obtaining the desired information. Anything like Jack-in-Office manners are the worst kind of abomination; and this nuisance is most difficult to detect from above.

The gas company who advertise well and adequately, will get in the way of learning many things about their business and their people that it will be to their advantage to hear. The whole tone of the establishment in relation to the public will be modified. Instead of looking at the solemn gas offices as though the building were a general hospital, never to be entered except under the direst stress of need, the place will gradually take on the amenities of a commercial mart. For advertisement implies readiness, even eagerness, to sell the article offered for sale; and this is an attitude towards the great public not reconcilable with the Town-Hall-*cum*-County-Court air that pervades many of the gas offices we wot of. All personal dignities are not the same. There is the dignity of the Parish Beadle, and there is the dignity of Mine Host of the "Red Dragon." There is also an intermediate shade of dignity, which is that of the honest tradesman ever-willing to oblige, who would feel himself disgraced only by unfair dealing. The last is decidedly a quality that deserves bold advertisement.

THE GAS AND WATER STOCK MARKET.

(For Stock and Share List, see p. 1078.)

BUSINESS on the Stock Exchange was only quite moderate last week, except in some speculative departments which take a line of their own. The general attitude was one of expectancy, waiting for the first four days for the Budget, and then considering it for the other two. A popular Budget is almost a contradiction in terms, for no tax ever was popular; but (barring the income-tax, which is terribly galling) this Budget is not so provocative as some. Of course, colliery owners are protesting that the shilling on coal is killing their trade, while, in point of fact, the cause of their diminished profits lies in the inevitable reaction from the inflated prices of last summer. The new issue of Consols at 94½ put the price in the market down, and on Friday they touched that figure once. And gilt-edged securities in general were rather flat; but the American market was booming. The Money Market was very easy, with an abundant supply in excess of all requirements; and discount rates were slacker, with indications in favour of still greater relaxation. Business in the Gas Market was fairly active in the aggregate; but operations were for the most part confined to Gaslight issues, and without the leading Company, transactions would have been almost *nil*. The tendency was steady on the whole; very few changes in quotation having been effected. Gaslight ordinary was marked at 95 for the first day or two. But then the price began to shrink a little; and on Friday 93 was touched. The closing mark was 94, with a fall of one point in the quotation. The secured issues were unusually active, especially the preference, which gained a point. South Metropolitan was almost overlooked; a couple of bargains being the sum total for the week. Commercials were equally neglected. The new stock, which had been left standing a little in advance of the old, was set back into line. The Suburban and Provincial undertakings were just as devoid of interest, transactions being few and far between. But good middle prices were the rule; and the general tendency was firm. The Continental group was perhaps the quietest of all; but it scored the chief advance of the week, with a rise of 2 in Imperial. The rest located in the remoter world were quite devoid of feature. Business in the Water Companies was at a very low ebb. There were only two changes in quotations; the preferences of East London and Southwark and Vauxhall being a little lower.

The daily operations being, as above noted, almost wholly confined to Gaslight and Coke issues, need not be further followed in detail. The changes were a fall of 2 in Commercial new on Tuesday, and of 1 in Gaslight ordinary on Thursday. But on Saturday, Imperial rose 2, and Gaslight preference 1. In Water, Southwark preference fell 2 on Wednesday, and East London preference 1 on Saturday.

PERSONAL.

Mr. GEORGE H. CLARK, who was for some years an articled pupil of Mr. George Lane, Assoc.M.Inst.C.E., of Aylesbury, has just arrived in England from Pará, where he has carried out four separate engagements with the Pará Gas Company, Limited, extending, in all, over a period of nearly ten years.

Mr. W. FLETCHER, the Cashier to the Birmingham Corporation Gas Department, after many years' service, has broken down in health, and will retire next month. Mr. W. H. POWELL will succeed him; and Mr. Powell's position of Assistant Secretary will be filled by Mr. DINGLEY, of the Town Clerk's office.

Mr. JAMES KINCAID, Gas Engineer and Manager to the Falkirk Corporation, last Friday evening entertained at the gas-works the employees in the Gas Department and officials of the Burgh and Water Trust. During the proceedings, Mr. Kincaid was presented by Mr. M'Figgans (of the Office Department), on behalf of those present, with a pair of handsome bronze figures and bronze gong, on the occasion of his forthcoming marriage.

Last Wednesday night, a company met in the Public Hall at Milngavie, to do honour to Mr. JOHN LEARMONT, Manager of the Milngavie Gas Company, on the occasion of his jubilee as a Gas Manager. Major Drew presided; and Mr. James M'Gilchrist was croupier. Mr. Learmont is a native of Wigtownshire, and was the son of a farmer. He left his native county at the age of nineteen, and went to Eaglesham, where he was for ten years foreman with James Mather, of Inches Farm. He next became Manager of the Eaglesham Gas Company in 1850, and remained there for eight years before going in 1859 to Milngavie, where he has since been employed. Last December was also the jubilee of the Milngavie Gas Company, which, in 1859, had a consumption of 2,437,000 cubic feet, with holder accommodation for 14,000 cubic feet. These gradually increased, until now the annual consumption is 13,000,000 cubic feet. Major Drew asked Mr. Learmont to accept an illuminated address, a silver salver, a silver tray, a pair of gold spectacles, and a purse of sovereigns, in token of the respect in which he is held by all, both in public and private life. Mr. Learmont suitably acknowledged the gifts.

NOTES.

Dry Distillation of Fir Wood.

The "Proceedings" of the Institution of Civil Engineers for the past year contain a contribution by Herr Irminger, of Copenhagen, on the above subject, an abstract of which was given in a recent issue of the "Journal of the Society of Chemical Industry." The author tested fir, spruce, birch, beech, and oak wood in the model retorts and other apparatus used for testing coal in the gas-works. The mode of conducting the tests is described, together with the apparatus employed; and the results are tabulated in two sets, according to the limit of temperature reached in the burning—being about 600° C. (1100° Fahr.) in the course of two hours, or about 700° C. (1300° Fahr.) in the course of only one hour. The total weight of the products of distillation—gas, pyroligneous acid or wood vinegar, tar, and charcoal—was within 4 per cent. of that of the wood put into the retorts. With the higher temperature, the gas was more abundant, and possessed a greater calorific power; but its specific gravity was lower, owing to the smaller proportion of carbon dioxide present. It is apparent, therefore, that the distillation should be effected at a low temperature—not above a dark-red heat—and that this temperature should be attained slowly. The crude gas evolved cannot be used direct as an illuminant, but can be employed for lighting in conjunction with a Welsbach mantle. In this manner a light of about 36-candle power is obtained with a consumption of 3 cubic feet of gas per hour. If 1000 lbs. of the fir wood be introduced into a red-hot retort (at about 1100° C., or 2000° Fahr.), 7600 cubic feet of gas are obtained having a calorific value of 460 B.T.U. per cubic foot; but the bye-products are less.

The Hundred-Miles-an-Hour Railway.

A good deal is likely to be heard this year of the proposed Manchester and Liverpool Electric Express Railway, which is to convey passengers between these cities at the rate of 100 miles an hour. Some information on the subject transpired at a recent Society of Arts meeting, when Mr. F. B. Behr read a paper describing the scheme. It is sufficient for general observers to know that the real difficulty in regard to this project does not lie in the running, but in the stopping of the trains. It is true that railway speeds up to 80 miles an hour are not unknown on the great trunk lines, for short distances and where all is clear ahead; but that is a different thing from timing a complete journey between fixed points at 100 miles an hour. Mr. Behr credits the Westinghouse brake with a retarding force of 3 miles per second—that is to say, an ordinary train running at a speed of 60 miles an hour can be checked 3 miles per second, and therefore brought to a standstill in 20 seconds, during which period it will have run 360 yards. All things being equal, a train running at 110 miles an hour should be stopped in 37 seconds, during which it will have travelled 995 yards. In addition to the ordinary brake, however, Mr. Behr proposes to equip his express train with reversing electric brakes, which, with the others, are credited with ability to stop the train in 500 yards. Although not positively dangerous, this rate of retardation would be admittedly uncomfortable for the passengers in the train. It is therefore the contention of the promoters that in practice their trains would not require braking at all. In the discussion on the paper, Professor C. A. Carus Wilson said the brake is the *crux* of the whole question.

The Composition of Dust and Soot.

It is some time since any fresh researches into the composition of atmospheric dust were published. It was recently stated that the air of the central parts of towns is not only far more dusty than that of country districts, but also that it is largely composed of bacteria. A paper on the "Mineral Constituents of Dust and Soot from Various Sources" has been read before the Royal Society by Professor W. N. Hartley and Mr. Ramage. It appears that Professor O'Reilly collected in St. Stephen's Green, Dublin, a quantity of solid matter which remained on a window-sill after an April hail-storm. It proved to contain iron, sodium, lead, copper, silver, calcium, potassium, nickel, and a trace of manganese. The remarkable composition of this sample of dust led to further investigations, including some analyses of soots of different origins. All these elements were found in soot, and in the flue dust of gas-works furnaces. The principal characteristic of dust which has fallen from the clouds is its regularity of composition—every specimen appears to contain the same proportions of iron, nickel, calcium, potassium, and sodium. The proportion of carbonaceous matter is small. The nature of soot from different sources is characterized by the small proportion of iron in most specimens, and of metals precipitated as hydroxides. It has a large proportion of lime, and its composition is variable. Nickel, calcium, manganese, copper, and silver were found to be constant constituents of soot from different chimneys and flues; but nothing is said about arsenic. A most striking feature is the quantity of rubidium, gallium, indium, and thallium in all the samples examined. With such a minute spectroscopic examination, it might be supposed that, if arsenic were present in the quantities now imputed to many samples of coal and coke, it would have been detected.

The Consumption of High-Voltage Electric Lamps.

It is reported that a good deal of dissatisfaction has arisen among users of incandescent electric lights in consequence of the doubling of the voltage by the supplying authorities; and several inquiries have been addressed to us as to whether there is any general reason for the charges for light being higher under the newer system of electricity supply. There should not be any such difference as these inquiries assume; and at the risk of repeating a familiar story, we will explain the electrical units once more, with special reference to the voltage. The only obvious effect of raising the voltage of a domestic circuit from 100 to 200 or 250 (which is the present maximum) is to increase in direct ratio the number of lamps of the same capacity that a circuit will carry. That is to say, a network of conductors will supply at the higher voltage double (or rather more) the number of lamps that would work satisfactorily at the lower voltage. The theoretical efficiency of the lamps should not be affected by the change. The validity of Ohm's law remains, whatever the value of the factors standing for its three elements of voltage, current, and resistance. It seems to be pretty generally admitted, however, that the high-voltage lamp is less efficient as a light giver than the older 100-volt lamp. For a short period before the alteration was effected, it became customary with electricians to compute the duty of the 16-candle power lamp as $3\frac{1}{2}$ watts per candle; but even so this high duty did not last long in actual service. Now it is the practice of compilers of wiring-tables for working electricians to take as their datum a duty of not less than $4\frac{1}{2}$ watts per candle for the standard 16-candle power lamp. This is tantamount to an admission that the modern high-voltage lamp is 25 per cent. more wasteful of current than its precursor, which may explain part of the increased charges.

COMMUNICATED ARTICLES.

THE PROBABLE EFFECTS OF THE COAL TAX.

When, last year, during the height of the coal boom, many people (the writer among them) discussed the question of an export duty on coal as a specific for the ills from which coal consumers were then suffering, few, if any of us, deemed the imposition of such a duty to be within the range of practical politics. In fact, in spite of persistent rumours that an export tax on coal was in contemplation, it may be said that the Chancellor of the Exchequer's announcement last Thursday of his intention to impose a duty of 1s. per ton on coal (other than bunker), shipped to foreign ports, came as a thunderclap upon the coal trade generally. The outcry that has arisen from the coal-exporting districts of Great Britain has apparently caused Sir Michael Hicks-Beach some surprise; and he is already reported to be contemplating a concession that would considerably reduce the revenue to be derived from the tax during the current year—namely, of exempting all coal exported under contracts previously concluded. It is suggested

that power of renunciation of such contracts might well be given to the owners; but, in view of the declining condition of the market, it is doubtful if that would be acceptable to the trade. Exemption is what they want.

The question of interest to the gas industry is, What effect is the proposed tax likely to have on the coal market at home? The answer is, I believe, that in the immediate future it will result in an accentuation of the "slump" in coal prices that has been witnessed during the past few months; but that in the long run it will make no difference whatever. My reasons for thinking so are these: The infliction of 1s. per ton on the coal exported will reduce the volume of those exports. Upon this point opinions differ widely. Sir Michael Hicks-Beach advanced, as his chief argument in favour of his proposal, the opinion that the duty "would do no real injury to our coal trade," as the foreign consumer could easily be made to pay. But, as he said, he argued this "from the facts of last year;" and that is where I think many people besides the Chancellor are inclined to fall into error.

His and their argument is this: Last year the average price realized for coal exported was about 6s. per ton more than in 1899; yet the quantity rose about 7 per cent. It is obvious, therefore, it is contended, that a mere matter of 1s. a ton would not diminish the volume of the export trade. Some persons even argue that a 5s. duty would not do so. But surely the argument is a *non sequitur*. Because, last year when trade everywhere was flourishing exceedingly, and the demand for coal, both here and on the Continent, exceeded the supply, a rise of 6s. per ton did not prevent our exports of coal increasing, it by no means follows that now, when trade is everywhere declining, and the supply of coal, both here and on the Continent, exceeds the demand, a handicap of 1s. a ton on English coal will not lose us some of our customers. On the contrary, considering the great falling off in business in Germany, and the very considerable increase in the production of coal there, little doubt can be entertained that, with with an extra 1s. to pay for English coal, many German buyers will place their orders at home instead of in the North of England or Scotland.

The Chancellor's argument is about as good as if one were to say that, because last year Yorkshire gas-coal owners were able to sell all their output at an increase of 6s. per ton, they would not lose custom this year if they had to pay 1s. duty on every ton produced, while Lancashire, Durham, and Northumberland were exempted. If the rise in prices had no effect on the export trade last year, how is it that there was a considerable falling off in shipments to far-distant countries, Brazil and the British East Indies in particular—countries which could draw supplies from America, Australia, and New Zealand if English coal was too dear for them?

There are, of course, certain qualities of English coal (especially the high-class steam coals) that are so superior to other qualities that a matter of another 1s. on the price will not check their outflow to foreign buyers. And they are the very particular kinds that those people who are in a state of anxiety as to our Navy running short of fuel are most desirous of forcibly keeping in this country! It is the cheaper kinds of coal, and also to some extent gas coal, that will feel the check of the new duty. The Germans are always anxious to obtain a larger share of the Baltic trade; and that they believe the 1s. tax will enable them to pick up more orders is evident from the rise in coal shares on the Berlin Bourse that followed the announcement of Thursday.

There is then, I think, every likelihood of the new tax, if it be persisted in, having as its immediate result the throwing upon the home market of a sufficient quantity of coal that would have otherwise gone abroad, to still further weaken the position of coal-owners in this country, and hasten the downfall of prices. The ultimate influence of the tax upon the home market will, I am assured, be none at all. Whether exports were taxed or not, coal prices would inevitably have fallen back to bottom figures; and, if the output then continued to exceed the demand, the more expensively worked pits would have been closed until the balance was redressed. That is what will happen now, only perhaps a little sooner; so that in the end consumers in this country will not derive any benefit from the check to our foreign coal trade.

In the end, moreover, the country generally will not profit. The Chancellor and others flatter themselves that we are going to make our foreign trade rivals pay a couple of millions annually towards our war expenses. Is that likely to happen? I do not think so. Assuming that the duty is not in any degree self-destructive, and that the extra 1s. is successfully charged upon the foreign purchaser, what will be the result? Well, with each outward cargo of coal we pay for the return cargo, or a portion of it. If we charge another £50 for the outward cargo, will not the foreigner do his level best to get that £50 back on the return freight? This is putting the matter crudely, and the operation may not in practice be so obvious; but it will take place nevertheless. And in so far as the duty may prove a check upon coal exports, so far also will it tend to raise the cost of our imports. Every ship that has to go out in ballast that formerly went out with coal, must charge a higher rate of freight for the return journey to make up for the loss of earnings on the way out. If that higher freight cannot be obtained, the profits of the shipping trade will be diminished, and the country will to that extent be impoverished.

The exact influence that a 1s. duty will have on the trade of this country is not easy to estimate, nor will that influence be incontestably evident when exercised. But a consideration of what a complete cessation of all coal exports would mean to this country may serve to show the tendency of that influence. To cease exporting coal would mean to reduce the spending power of the nation by about £25,000,000 per annum (the f.o.b. price of the coal), to deprive 150,000 miners of their occupation, to reduce the income of our mercantile marine (or to increase the cost of imports) by £10,000,000 a year, and, by increasing the cost of living abroad, to raise the price of imported goods, and to diminish the purchasing powers of our foreign customers. The one item on the credit side of the account would be 46 million tons of coal more in stock, *of absolutely no value to the present generation unless brought to bank and sold*. The benefit would accrue (perhaps) to our great-grandchildren's grandchildren.

As a means for raising sorely-needed money, the tax on coal may be defended. Every tax is, of course, a hindrance to trade; so that that, of itself alone, is no argument against any particular tax. But, in so far as it has been imposed as a stroke of policy designed to benefit the nation by conserving its coal resources, it is, in my opinion, certain to have, eventually, nothing but mischievous results. It remains to be seen whether the Chancellor will persist with his proposal.

FURTHER NOTES ON PURIFICATION OF GAS.

By S. Carpenter, of East Ham.*

Coal gas, as it issues from the hydraulic main, contains the following impurities: Ammonia (NH_3), carbonic acid (CO_2), sulphuretted hydrogen (SH_2), and bisulphide of carbon (CS_2). At the outlet of the hydraulic main the gas passes into the condensers, where it is cooled, and the tar and watery vapour are deposited. From these vessels, it goes into the washers and scrubbers, which remove the ammonia from it by "scrubbing" it with ammoniacal liquor and clean water, and also a portion of the carbonic acid and sulphuretted hydrogen. The remaining operations in the purifying process are effected in the purifiers.

At the outlet of the scrubbers, the gas should be tested for ammonia by the Referees' test, which is performed in the following way: Take 50 septems of the test acid, and pour it into a glass cylinder made for the purpose. Care should be taken to well wet the whole interior surface, and also the glass beads with which the cylinder is charged. Connect one terminal tube of the cylinder with the gas supply, and the other with the meter, and make the gas pass at the rate of about 0·5 foot per hour. Any ammonia in the gas will be arrested by the sulphuric acid, and a portion will be neutralized thereby. At the end of each period of testing, wash out the cylinder and its contents with distilled water, and collect the washings in a glass vessel. Transfer one-half of this liquid to a separate vessel, and add a quantity of a neutral solution of hæmatoxylin or litmus, just sufficient to colour the liquid. Then pour into the burette 100 septems of the prepared standard solution of the test alkali, and gradually drop it into the measured quantity of the washing collected—stirring constantly. As soon as the colour changes, read off the quantity of liquid remaining in the burette. To find the number of grains of ammonia in 100 cubic feet of gas, multiply by two the number of septems of test alkali left in the burette, and move the decimal point one place to the left. This will give the percentage of ammonia. The gas may also be tested for ammonia in the following way: Take either yellow turmeric paper or prepared red litmus paper, and direct a small stream of gas on to it. If the gas causes the turmeric paper to turn a red brown, or the litmus paper a full blue in less than (say) a quarter of a minute, it will indicate the presence of ammonia in the gas.

Having dealt with the ammonia, I will now consider how and where to detect the remaining impurities—the carbonic acid, sulphuretted hydrogen, and bisulphide of carbon. At the inlet of the scrubbers, the gas should be tested with the eudiometer for carbonic acid and sulphuretted hydrogen. The process is as follows: Take a portion of the gas in the eudiometer, add a solution of acetate of lead, and shake well. Put the tube into water, and let it remain there for two minutes; then read off the extent of the absorption, which will give the percentage of sulphuretted hydrogen in the gas. Next add a few drops of a strong solution of caustic potash. Shake well, and let it rest for two minutes; then read off the absorption, which will give the percentage of carbonic acid in the gas. Test the gas in the same way at the outlet of the scrubbers; and the result will show what impurities have been taken out by these appliances. The other test for carbonic acid is lime water; and for sulphuretted hydrogen, slips of paper moistened with sugar of lead are used.

In order to purify gas from carbonic acid and part of its sulphuretted hydrogen and bisulphide of carbon, it is passed from the scrubbers through two purifiers charged with hydrate of lime. The work of the first lime purifier is principally to decarbonate the gas before it enters the second purifier. It should be tested for both of the above-named impurities at the inlet, middle, and outlet of the first purifier in the following manner: Take off first a portion of the gas at the inlet, and pass it through a small hand purifier charged with oxide of iron to eliminate the sulphuretted hydrogen; and then test for bisulphide of carbon. Test at the outlet of the purifier in the same way for carbonic

* The author has prepared this article expressly for students and young gas managers.—Ed. J.G.L.

acid and bisulphide of carbon. The test at the inlet will show what sulphur there is in the crude gas; that at the outlet the quantity of bisulphide of carbon and carbonic acid present. From this point the gas goes into the second purifier, which is charged with hydrate of lime; and the remaining sulphuretted hydrogen and the bisulphide of carbon will flow on with it. Here the lime is ready to remove another portion of these impurities; and the gas at the outlet should be tested in the same way as before. The result will show the number of grains of bisulphide of carbon in 100 cubic feet of the gas at this part of the apparatus. To remove the remaining sulphuretted hydrogen, the gas is passed into purifiers charged with oxide of iron. It should be tested at the inlet and outlet of each of these purifiers, in order to ascertain whether every trace of impurity has been removed. It should also be tested for bisulphide of carbon at the outlet of the gasholder, to see what quantity there is in the gas passing into the main delivering it to the consumers.

For testing gas for bisulphide of carbon, the Referees' sulphur test is employed. The following is a description of the apparatus: The gas is consumed in a small bunsen burner with steatite top, mounted on a short cylindrical stand perforated with holes for the admission of air, and having on its upper surface a deep circular channel to receive the wide end of a glass trumpet-tube. On the top of the stand, between the narrow stem of the burner and the surrounding glass trumpet-tube, are to be placed pieces (about 2 oz.) of commercial sesqui-carbonate of ammonia. The products both of the combustion of the gas and of the gradual volatilization of the ammonia salts pass upwards through the trumpet-tube into a vertical glass cylinder, packed with balls of glass, to break up the current and promote condensation. From the top of the cylinder there proceeds a long glass pipe or chimney, serving to effect some further condensation, as well as to regulate the draught, and afford an exit for the uncondensable gases. In the bottom of the cylinder is fixed a small glass tube, through which the liquid formed during the testing drops into a beaker placed beneath. At the end of each period of testing the cylinder and trumpet-tube are to be well washed out with distilled water. The liquid in the beaker and the water used in washing out the apparatus should be put into the same vessel, well mixed and measured. One-half of the liquid so obtained is to be set aside, and preserved for a week, in case it should be wanted; the other half put into a beaker, treated with hydrochloric acid sufficient in quantity to leave an excess of acid in the solution, and then raised to boiling-point. An excess of barium chloride is now added, and boiling continued for five minutes. The vessel and its contents are to be allowed to stand till the barium sulphate settles, after which the clear liquid is to be poured off, as far as possible, through a paper filter, and the latter well washed with hot distilled water. A small quantity of the washings from the filter should be placed in a test-tube, and a drop of a solution of silver nitrate added. If, instead of remaining perfectly clear, the liquid should become cloudy, the washing must be continued until, on repeating the test, no cloudiness is produced. Dry the filter and its contents, and transfer it to a weighed crucible. Heat this over a Bunsen burner, increasing the temperature gradually from the point at which the paper begins to char up to bright redness. When no black particles remain, allow the crucible to cool; and when it is nearly cold, place it for a time in a desiccator, over strong sulphuric acid, and again weigh it. The difference between the first and second weighings will give the number of grains of barium sulphate. Multiply this by 11, and divide by 4; and the result will be the number of grains of sulphur in 100 cubic feet of the gas. This is to be corrected for the variations of temperature and atmospheric pressure, which takes up a good deal of time.

There is another method in which the results of the sulphur test may be worked off, and it is much easier to manipulate than the one just explained. It is called the "cold" process, as there is no boiling connected with it. The following is a description of this short and simple plan, which is intended more especially for the use of those gas testers who are not qualified chemists, or who, through pressure of other duties, are desirous of simplifying the process of testing, so as to minimize the time necessary to be spent thereon. It is as follows: The liquid in the beaker, resulting from the condensation of the products of the test, is placed in a graduated vessel to which is added the washings of the trumpet tube and cylinder. The liquid is then made up to one pint by the addition of a sufficient quantity of distilled water. Of this liquid 1000 grains are then taken, and treated with sufficient hydrochloric acid to leave an excess of acid in the solution. By this means any carbonates are decomposed. An excess of the solution of barium chloride is next added, and the liquid allowed to stand until the thick white precipitate settles at the bottom of the vessel. The clear portion of the liquid is then poured off and passed through a filter. When this is done, the thick sediment is poured on to the filter, and the latter well washed with distilled water by means of the wash-bottle. The filter is then allowed to stand a short time to dry, after which it is transferred to a weighed platinum crucible, and heated over a bunsen burner to a bright red heat. When no black particles remain in the crucible, turn off the gas, and allow it to cool. The crucible and its contents are then again weighed; and the difference between the first and second weighings will give the number of grains of barium sulphate resulting from the test. Note the quantity of gas consumed in the test; then, upon reference to the table, the number of grains of sulphur present in 100 cubic feet can be ascertained.

(To be continued.)

TECHNICAL RECORD.

THE MEETING OF THE INSTITUTION OF GAS ENGINEERS.

Programme of the Proceedings.

The outline of the proceedings at the meeting of the above-named Institution, to be held at the Institution of Civil Engineers on Wednesday and Thursday next week, which was given in the "JOURNAL" for the 2nd inst., is borne out by the official programme which has since been issued. The retiring President (Mr. J. W. Helps, of Croydon) will take the chair at half-past ten on the morning of the first-named day, when the usual routine business will be disposed of. This will include the presentation by the Council of their report and the statement of accounts, the election of new members, and information regarding the result of the labours of the Scrutineers. The report of the Council opens with an expression of their pleasure in announcing the maintenance of the prosperity of the Institution. Reference is next made to the acceptance of the invitation received from the Société Technique to take part in the Gas Congress held in Paris in connection with the Exhibition. The visit to the French capital in September was fairly well attended, and was fully appreciated by all who took part in it. The Council record that considerable work was done by the congress, under the courteous lead of M. Vautier, in the reading and the discussion of a large number of papers; and a very generous reception was accorded to the members of the congress by the Société Technique. A description of the congress visit forms an important addition to the volume of Transactions for the year. In addition to the members and associates elected during the past twelve months, five students have been admitted by the Council. With regard to the amalgamation of the two Societies referred to in the previous report, the Council state that the steps taken by them were duly approved at the last general meeting, but the proposal was rejected by the Gas Institute. Since then the Council have received certain other suggestions, which they have endeavoured fairly to meet. The two Councils have discussed these matters; and, in the result, the Council have decided to lay the case fully before the members in a separate report, which it is proposed to read and discuss at the meeting. Reference is made to the loss sustained by the nation, since the last meeting, by the death of the Queen, and to the presentation of an address of condolence to His Majesty the King and the Royal Family, together with an expression of the Institution's hearty congratulations upon His Majesty's accession to the Throne. The Council record with deep regret the deaths of Mr. W. S. Randall and Mr. A. G. Hounsham, the latter of whom discharged the duties of provisional Secretary on the formation of the Institution.

These matters having been disposed of, the new President (Mr. Walter R. Herring, of Edinburgh) will deliver his Inaugural Address, after which the reading and discussion of papers will be proceeded with. The first item on the list is a report, prepared by the outgoing President, on the negotiations for amalgamation. Next comes the paper by Mr. B. W. Smith, of Walsall, on "Methods of Purification," of which he has prepared the following synopsis, in compliance with the wish of the Council:—

General outline of the treatment of coal gas from the hydraulic main to the inlet of the purifiers. The different kinds of purifiers and material used. Value as a purifying agent. Summary of replies received from the various gas-works in the United Kingdom, showing the number using lime and those using oxide. Remarks upon the various methods in vogue. Analysis of lime and different oxides before use. Analysis of lime and oxide after use. Remarks upon the efficiency or otherwise of the action of the material. General conditions most favourable for the use of lime or oxide.

The title of the next paper is "Notes on Water-Gas Manufacture," and the author (Mr. T. Holgate, of Halifax) has summarized its principal points as follows:—

The relative advantages of (*a*) water gas enriched with benzol, and (*b*) carburetted water gas. The best design and method of working the generator so as to attain maximum results for (*a*) or for (*b*). The Dellwik, Strache, and Lowe types. Capacity of plant should be stated in conjunction with a fixed percentage of CO_2 in generator gases. The value to be attached to the use of hot coke, continuously or intermittently supplied, and to the use of preheated air or steam. The most satisfactory blast pressure and steam pressure. Mechanical details of the generator: (*a*) Water-sealed ashpit, or (*b*) ordinary grate provided with larger clinkering doors than usual, (*c*) valves for securing up and down runs, (*d*) the best form of coke buggy. Mechanical details of blowing-room: (*a*) Slow-speed engines, (*b*) high-speed engines, (*c*) enclosed engines, (*d*) Roots blowers, (*e*) Sturtevant fans. Boilers required. Utilization of coke from generator cleanings. Carburettor: The oil injector—Botley's, Cutler's, and other methods. Temperature of oil. W. Young's idea of gasification of oil. A continuous test for CO_2, and a record of pressure in carburettor. Superheater—regulation and recording of temperature by the electrical pyrometer. Stack valve, tightness and accessibility. Emission of flame from stack. Dust interceptor. Condensers, scrubbers, tar separator. Circulation of oil to prevent formation of emulsion, and to facilitate re-cracking of imperfectly treated oils. Supplementary condensers to remove the last oil vapours frictionally. Smell of tarry matter to be avoided. Water-gas tar—its composition and separation. Relief holder. Exhausters. Purification. Measurement. Testing. Illuminating power. Calorific

power. Mixing, burning, and generally meeting the needs of the consumers. Naphthalene. The direction of further developments: (*a*) More perfect utilization of heat, (*b*) admission of water gas (blue or carburetted) into hydraulic or foul main of coal-gas plant, (*c*) washing with ammoniacal liquor to remove the bulk of the CO_2 and H_2S. Precautions. Oxygen bottle. Preferably making the bulk of water gas from 6 a.m. to 10 p.m. Statistics should be based upon the following: (1) Capital cost of plant from the oil storage tank to outlet of purifiers. (2) Interest upon do. per 1000 cubic feet of gas made per annum. Sinking fund do. (3) Boiler fuel and generator fuel separately stated in pounds per 1000 cubic feet of purified gas. (4) Oil in gallons per 1000 cubic feet of purified gas, along with the gravity and character of such oil. The illuminating power of the gas made. (5) Where gas is tested: (*a*) Distance from outlet of purifiers, (*b*) kind of test-burner, (*c*) rate per hour at which gas is consumed, (*d*) the standard employed, whether pentane or candles. (6) The quantity and gravity of water-gas tar produced per 1000 cubic feet of purified gas. (7) The percentage of CO_2 and H_2S, separately stated, in the crude gas, whether washed with ammoniacal liquor or purified through oxide and lime. Cost in materials and labour, separately stated, per 1000 cubic feet of purified gas. (8) Wages: (*a*) Coke handling; (*b*) gas making, including boiler attendants, exhauster and machinery attendants, operators; (*c*) repairs to machinery; (*d*) repairs to generator, carburettor, and superheater.

This will conclude the first day's business, and the members will dine together in the evening at the Queen's Hotel, Leicester Square.

On the following day, the first paper to be taken will be that by Mr. C. E. Brackenbury, entitled "Some Differences between British and Continental Gas Engineering." The author will deal therein with the following matters:—

Definition of terms. Difference in training of staff. Beauty in gas-works. Hours of labour. Handling coal and coke. Retort furnaces and settings: Shape of retort; retort mountings; comparison of inclined retorts; stoking machinery. Sequence of manufacture. Exhausters; tar extracting and condensation; washer-scrubbers. Electricity in gas-works. Boiler practice. Purification. Valves and station meters. Gasholders and station governors. Enriching apparatus. Residuals. Labour questions. Distribution. Public illumination. Incandescent lighting. Consumers' meters. Gas-stoves. Concluding summary.

The last paper on the list is Mr. J. D. Ashworth's, bearing the title of "The Progressive Age," of which the following is a synopsis:—

The existing competition from electricity. The prospective competition from Mond gas and similar gases. Suggestions as to how these may be best met. What should be the standard illuminating power?

On Friday, the 3rd prox., the members will visit the Admiralty Harbour Works at Dover; leaving Charing Cross Station at 9 a.m. Full particulars of these works, accompanied by a plan, are given on the programme.

MODERN GAS PRACTICE.

Most engineering readers of the "JOURNAL" have an acquaintance with the theatre of the Institution of Civil Engineers; and if they will picture to themselves the rows of benches completely filled, they will have an idea of the size of the audience facing the President, Mr. James Mansergh, when Dr. J. H. T. Tudsbery (the Secretary of the Institution) read, on Tuesday last week, the paper on "Modern Practice in the Manufacture and Distribution of Gas" from the pen of Mr. H. E. Jones, the Engineer of the Commercial Gas Company. Here and there in the large assembly were groups of London and provincial gas engineers, who, looking for wisdom from out of the East, came to hear first-hand from Mr. Jones exactly what are his ideas on modern gas practice. We are debarred, by the rules of the Institution, from publishing *in extenso* the paper or a report of the discussion.

Naturally, before a body of the mixed constitution of the Institution, it behoved the author to deal in a somewhat prolix manner with many of his points, in order to fully expound their meaning and import to his contemporaries in the collateral branches of the engineering profession. For example, he started with a reference to the three far-reaching departures in respect of the consumption of gas which have marked the closing years of the past century, and the full significance of which has hardly yet been realized, or their prospective influence fully estimated—viz., the Welsbach burner, the coin meter, and the sliding-scale legislation. On the first point—incandescent gas lighting—he told in more words than would have been necessary before an audience composed purely of gas engineers how it has assisted gas; and he took the opportunity (which, by the way, he never allows to slip) of dropping a shot or two into the electrical camp. We can imagine the zest with which Mr. Jones wrote such words as these: "Welsbach gave to the gas industry a burner which has armed it against all competition for indoor and outdoor illumination, wherever comparative cost is regarded. This statement is made without limitation, because by compression and heating of the gas, and by grouping the burners in clusters, illuminating powers can be obtained which rival the electric arc, and that at a relatively insignificant cost." In regard to the second of the departures the benefits which the coin-meter supply has conferred upon the working classses and the help it has rendered in consolidating the position of gas supply were dwelt upon. Figures were given in proof of this point. In the ten years ending 1899, the addition to the number of gas consumers through the prepayment system in the case of the Wandsworth and Putney Gas Company was 223 per cent., the South Metropolitan Company 165 per cent., and the Crystal Palace Gas Company 119 per cent.

The third point—viz., the sliding-scale legislation—received very full consideration from the author; and it supplied, with the branches which spring therefrom in the treatment of the subject which he adopted, the ground for discussion. The sliding-scale, said the author, has urged to cheaper methods of production, greater attention to residual products, more careful expenditure of capital, efforts towards popularizing the use of gas, &c. He showed that the growth of gas supply has been greatly affected by these causes—pointing to the fact that the volume of trade has increased by 21¾ per cent. in the past four years, and this is calculated upon a basis already so large as compared with any analogous industry that the increase shown, whether considered in money value or in volume of production, is far in excess of what has accrued to any competitive system. In this connection, it may be observed that, according to Garcke's return, the electric light industry in 1899 had a capital of £23,279,347, compared with £99,046,880 for gas lighting, or 23½ per cent. While if 4 watts be taken for 1-candle power per hour and 3 candles per hour only as the illuminating value of the gas by ordinary burners, then the electric output is equal to 31,279 million candle-hours, against the gas output equal to 407,165 million candle-hours, or only 7·7 per cent. As the author remarked, the factors already mentioned have resulted in the reduction of the price of gas, which in its turn has stimulated consumption in the day and summer time, without increasing the capital or working expenses in the same degree. As an illustration, he mentioned the case of one Metropolitan Company whose daily consumption, between 6 a.m. and 6 p.m. in the month of July, has been quadrupled in twelve years.

Among the methods adopted by the gas industry to bring about cheaper production, Mr. Jones first alluded to labour-saving appliances of various types—grabs, retort-house machinery, conveyors, crushing and sifting machinery for coal and coke, inclined retorts, and machinery for dealing with purifying material. But he pointed to a limitation of their useful and economical adoption. "Such apparatus," he said, "could be introduced with safety and real economy only on works of adequate size; and many of the machines as yet fail to attain the speed and efficiency of zealous and well-directed hand labour. Moreover, the coke from machine-worked retorts is not worth so much as that from the manual system by 1s. 6d. to 2s. 6d. per ton; while it is much softer, and loses more by storage." Then came some remarks on the improvement in the return from residuals—the element in the cheapening of production to which Mr. Jones gave second place. He instanced the saving of coke used as fuel, the better separation of ammonia, the extraction of cyanogen, and the new additions to the bye-products of tar. Breeze, graphite scale from the retorts, naphthalene, and even the refuse-purifying materials are now all turned to account. Indeed a striking difference between gas making and all other uses of coal is the large value realized by the sale of residuals after providing for the requirements. In dealing with these points, he noted the reaction upon the price of coal of the increased use of gas for fuel, which, while forcing upon gas manufacturers the production of a larger quantity of coke, on the other hand *pro tanto* shuts the outlet for it by diminishing its applications. This, he said, causes powerful competition with coal, and tends to reduce its price. Bearing in mind that for every ton of coal carbonized, at least ½ ton of coke is forced on the market, and that, except by maintaining the balance between supply and demand, there are no means of controlling the price of the coke, it must be recognized that here is a powerful check against any undue enhancement of the price of coal. An observation as to the enrichment of gas affecting largely the return from residuals by reducing the coke available for sale, gave the author an opportunity for putting in a word as to the cost of enrichment inevitably exceeding its relative value to the consumer, even in the ordinary forms of burner, while in the case of the Welsbach burner it may be said to be absolutely wasted.

Regarding carburetted water gas, however, he referred to this as affording a convenient, cheap, and effective means of giving a permanent additional illuminating power. Tabular statements were exhibited, which brought out (for works on the Thames at recent current market values for oil and coke, by plant as arranged by Messrs. Humphreys and Glasgow) the cost for 20-candle gas at 18·19d. per 1000 cubic feet and for 14½-candle gas from Durham coal 16·98d. In the table, he gave the wear and tear for the water-gas plant at 0·54d.; and upon this a remark was made that it may prove that an addition of ½d. to 1d. should be invested annually to provide a sinking fund for renewal. The collateral advantages incidental to the system were duly set forth by the author; and from a statement of his general views, it was gathered that, where enrichment is necessary, carburetted water-gas plant is practically indispensable, but where good facilities exist for receiving coal from ships or railways (and especially where the standard of illuminating power is within the compass of common coal), then for the larger part of the year coal-gas plant must generally be the more economical. At the same time, he said: "To reduce capital expenditure, to save space, to give greater flexibility in the output, to avoid the mid-winter pressure on collieries, steamers, and railways, and to avoid glutting the coke market, means not only saving in money, but less risk to the gas-works service—to say nothing of the relief from anxiety on the part of the

staff. Only in this way, it is believed, can this auxiliary plant be safely and economically applied; and the author would deprecate any general rush to the system." Then, later on, he did not forget to mention that with incandescent mantles there is no real necessity for enriching the water gas, which in its crude state can be produced at a saving of (roundly) 1s. per 1000 cubic feet, and would be for all purposes equally useful to the consumers, and even more valuable for heating purposes. In undertakings now supplying illuminating gas at a charge varying between 2s. 2d. and 2s. 8d. per 1000 cubic feet, this saving would bring the rate down to between 1s. 2d. and 1s. 8d. per 1000 cubic feet, which reduction could not fail to develop immensely the use of gas for power and heating purposes.

While the importance of the various advantages arising from the improved methods and developments indicated in the foregoing sketch of the paper to this point cannot be disregarded, it was pointed out by the author that it is in the limitation of capital expenditure that the greatest permanent saving is to be attained. As a rule, undertakings supplying cheap gas are those with relatively small capitals. In the case of the leading gas undertakings in Field's Analysis, the dividend and interest charge varies between 7¼d. and 17d. per 1000 cubic feet; so that here there is room to abate the selling prices of gas by a considerable fraction of a shilling, while the economy to be effected by labour-saving appliances is limited to a penny or two per 1000 cubic feet, discounted by an increased charge for wear and tear. Where conditions are not too unfavourable, works, mains, meters, and working capital can be provided for between £400 and £500 per million cubic feet, for an output of 50 millions per annum and upwards. On this the ordinary dividend of 5 per cent. would only entail a charge of £20 to £25 per million cubic feet, or between 4·8d. and 6d. per 1000 cubic feet. For twenty-six years capital had been raised under parliamentary compulsion by auction, and had only demanded about 4 per cent. A few steps farther on, Mr. Jones read his auditors a little homily on the necessity of making extensions as far as possible at periods when moderate prices rule, on adopting inexpensive forms of construction, and on rigorously writing off displaced or disused plant and buildings. "It is plainly idle," he sagely remarked, "to strive for small economies by introducing expensive complications while shutting out of sight the larger permanent burden resulting from an inflated and unwarranted capital account." He examined the subject of capital in some detail, and indicated the scope for economical treatment which an engineer possesses in selecting and designing the site and plant for his works. Here he again adverted to the subject of the equipment of works (of sufficient size to employ them) with coal-grabbing cranes, regenerative furnaces, and mechanical appliances for charging and drawing retorts. The cost of carbonizing per 1000 cubic feet with the fully machine-equipped retort-house he placed at 1·2d. per 1000 cubic feet, against 2·5d. by ordinary hand charging and drawing in a ground-floor retort-house. A reference was interpolated here to the cheap plan of semi-machine stoking designed by Mr. H. S. Freeman at the Wandsworth Gas-Works, where the ordinary ground-floor retort-house and direct-fired retorts produce makes of 7000 cubic feet per diem, and the cost of carbonizing is 1·5d. per 1000 cubic feet. Inclined retorts are manifestly not in favour with Mr. Jones. Stating that the cost was £100 per retort, and that the working cost is put at 0·9d. per 1000 cubic feet, he remarked upon the "undisputed drawback" that, at the angle of inclination suitable for easy discharge of the coke, the coal, when highly bituminous, is very liable to slip down the heated surface and choke the lower end of the retort. The objection, he said, is well recognized, and must be absolutely overcome before the system can make much headway.

The author's practice in regard to purification is interesting. He has long constructed his purifiers without hydraulic seals to the covers, which are not only held down and jointed by bolts round the edges, but are enabled to resist the pressure within the purifiers by long internal bolts equally spaced over the area, and holding the cover to the floor of the purifier, so that the cover itself does not need to be heavy and consequently expensive. Owing to the difficulty of maintaining the absolute gas-tight condition of large slide-valves, water-sealed valves are now used exclusively by Mr. Jones. The purifiers are equipped with cranes for charging them; and are preferably arranged over a floor or cellar into which they are discharged by gravitation. Adjoining vessels are separated by one plate only. They are 8 feet deep, and are arranged in groups of five, worked in ordinary sequence, having both lime and oxide in each. The cost of such a set arranged in a suitable three-storey building, necessary for maintaining the proper temperature and for dealing with the fresh and spent materials for an output of 2 million cubic feet per diem, is £9157, or £23 per million cubic feet of annual output. For condensation, the author has a preference for horizontal tubes, in which the gas is cooled in contact with the tar and ammoniacal liquor. This, he declares, is not only the cheapest form, but it is the only one which affects the separation of naphthalene. For removing ammonia, he still has a decided liking for the original coke scrubber. These uses of tar, ammoniacal liquor, and coke led up to an interesting statement of some length, showing how the purification of gas is essentially linked with the separation and production of the residuals.

The storage of gas was the next subject to receive consideration; and the views of Mr. Jones thereon are those which are generally accepted. To the tank, constituting the most difficult part of the work, and that in which the greatest saving can be effected, he gave prominent attention; and he proved his case for cement concrete tanks where circumstances do not compel the construction of tanks above ground on artificial foundations. In such special cases, he advocated the use of mild steel. Some comparative prices were furnished. A concrete tank in 1900 for a three-lift gasholder containing 1¾ million cubic feet, cost £5790, or £3 5s. 10d. per 1000 cubic feet; a brick-and-puddle tank for a three-lift holder for 2¾ million cubic feet would cost at the present date in clay soil £14,700, or £5 9s. per 1000 cubic feet; a steel tank for a four-lift holder for ¾ million cubic feet, constructed in 1899, cost £5220, or £6 18s. per 1000 cubic feet; and a cast-iron tank, designed in 1897, for a three-lift holder, for ¾ million cubic feet, was estimated to cost £8975, or £14 5s. per 1000 cubic feet. Regarding the holders, he gave the following as the chief features of economical construction followed in recent practice: "The entire use of steel. The abandonment of metal trussing to the crowns, reducing the floating weight (which tends to be excessive in triple or higher multiplication of lifts), and cheapening the cost. The crown and roof when landed rest upon a timber stage permanently fixed in the tank." He described the latest method of constructing the guide-framing of holders by an increased number of vertical members of rolled joist section, strutted at short intervals by horizontal joists or girders, and braced by flat bars of steel, and explained the advantages. The importance of the guide-bars on the upper framing and in the tank being coincident and continuous was mentioned. This section of the paper concluded with the interesting statement that the cost of a holder for 1¾ million cubic feet completed in 1900 was £8590, or £4 18s. 1d. per 1000 cubic feet, and that of a similar holder in 1898 for ¾ million cubic feet was £5000, or £6 13s. per 1000 cubic feet, which was an illustration among others he had cited of the effect of the scale of operations in a gas-works reacting inversely on the cost per unit of capacity.

The question of distribution received careful treatment by the author; and the tenor of what he had to say is found in his opening words: "Economy in capital outlay is secured, and much waste is avoided, by laying, in the first instance, mains of liberal calibre." Speaking of main arteries (which he said should be as few in number, and of as large a diameter as possible, in order to give the largest duty from the weight of metal employed, and that with the least friction), he stated that, within the past year, in the suburbs of London, a 30-foot road was opened for a 24-inch main to be laid, and was found to be occupied by eight pipes of another company—one 36-inch, one 30-inch, one 16-inch, one 15-inch, one 9-inch, one 7-inch, one 6-inch, and one 4-inch pipe, having an aggregate weight of 3390 lbs. per yard. It is impossible, remarked Mr. Jones, to conceive that all these separate mains were necessary for any useful purpose whatever, while their collective capacity could have been provided by one main weighing 1946 lbs. per yard and 48 inches in diameter, or by two mains weighing 1320 lbs. per yard, or 36 inches diameter. An incidental allusion was also made to what Mr. C. C. Carpenter has done in the way of increasing gas pressures, on special connecting-mains in the South London district, to 12 and 18 inches head of water, and to high-pressure gas distribution in America. A short paragraph also introduced the question of electrolysis; and it was stated that the mains of the South Metropolitan Company and the gas and water mains in Manchester, Preston, and elsewhere were beginning to give evidence of its occurrence. The difficulties caused by the modern systems of paving were not overlooked by the author; and in such cases, he observed, the gas engineer was tempted to hope for an extension of subways, even at a rental for their use. According to his practice, service-pipes of steam-tubing are now being laid. It is 30 per cent. thicker than gas-tubing, and is expected to endure without renewal an even longer period than is represented by this additional thickness. On the question of meters, he referred to the fact that the superior convenience of the dry-meter has made it such a favourite with the public that it has practically displaced the wet type.

There is one of the concluding paragraphs which, coming from an engineer of the position of Mr. Jones, which we must quote *in extenso*. It is this: "It is unfortunate that those responsible for considerable undertakings are often neglectful of securing the services of competent engineers, and mistakenly afford remuneration quite insufficient to procure adequate technical qualifications. Abroad, a very different view is held; and at comparatively small gas-works is to be found not only a commercial and financial general manager, but a trained engineer who has almost invariably obtained some satisfactory diploma in science."

North of England Gas Managers' Association.—The forty-eighth half-yearly meeting of this Association will be held at the Gas Office, Newcastle-upon-Tyne, next Saturday, under the presidency of Mr. E. H. Millard, of Durham. We learn from the circular issued by the Hon. Secretary (Mr. J. H. Penney, of South Shields) that there will be no paper on the occasion; the business consisting of the presentation by the Committee of their report on the proposed "federation of gas-works employers to deal with the labour question," in accordance with the suggestion made by Mr. T. Bower at the October meeting last year, and the election of office-bearers and members. Arrangements have been made for an inspection of the gasholder in course of erection at the site of the proposed new gas-works at St. Anthony's; and the usual dinner will be held at the County Hotel.

EASTERN COUNTIES GAS ASSOCIATION.

The Twenty-fifth General Meeting of the Association was held last Thursday at the Maid's Head Hotel, Norwich, under the presidency of Mr. J. G. HAWKINS (Spalding). The attendance, outnumbered the recent average. In this respect, as well as in the character of the proceedings, the meeting exceeded anticipations; and the Committee and the members have been placed under a debt of gratitude to Mr. John Young, the Engineer and Manager of the Norwich station of the British Gaslight Company, for the liberal provision he made for the technical part of the programme, and to his Directors for the generous manner in which they took upon themselves the *rôle* of hosts, and entertained the members. The President of the Gas Institute (Mr. T. O. Paterson, of Birkenhead) honoured the Association by his presence; and Mr. H. B. Chamberlain, the Secretary of the British Gaslight Company, represented his Board.

After a light lunch, the business part of the programme was taken in hand—beginning with the consideration of purely formal matters.

The HON. SECRETARY (Mr. J. H. Troughton, of Newmarket) opened the proceedings by reading the minutes of the last Autumn meeting held at Spalding; and they were confirmed.

Several letters of regret at not being able to be present were read—among the writers being Mr. W. R. Herring, the President of the Institution of Gas Engineers; Mr. T. Glover, the President of the Midland Association; and Mr. C. Wood, the President of the Manchester Institution.

ANNUAL REPORT AND ACCOUNTS.

On the motion of Mr. H. WIMHURST (Sleaford), seconded by Mr. J. DAVIS (Gravesend), the Committee's annual report and accounts were adopted. The former, as usual, reviewed the work of the year; and among general matters of interest it stated that the year commenced with a membership of 66. One member resigned; and three severed their connection with the Association by the operation of Rule 19. Three new members were elected during the year, leaving the total membership at 65. The accounts showed a balance of £34 9s. 9d. brought forward; and the subscriptions paid amounted to £40 8s. 6d.—making a total of £74 18s. 3d. The expenditure was £34 10s. 11d., which leaves a balance of £40 7s. 4d., and a few subscriptions outstanding.

A GOOD ADDITION TO THE ROLL.

The HON. SECRETARY proposed, and Mr. W. D. CHILD (Romford) seconded, the election as members of the following gentlemen: Mr. A. E. Broadberry, of Tottenham; Mr. F. Smallbone, of Woodford; Mr. F. Paternoster, of Felixstowe; Mr. J. W. Gibson, of Haverhill; Mr. G. W. Turner, of Wainfleet; and Mr. J. Baldwin, of Gainsborough.

The proposition having been unanimously adopted,

Mr. J. DAVIS moved, and Mr. ARTHUR GRAHAM (Mansfield) seconded, the election of Mr. C. R. Ayton, of Wymondham, and Mr. B. B. Waller, of London, as associate members.

The motion was agreed to.

Mr. JOHN YOUNG (Norwich) read the following paper, giving

HINTS ON GAS SELLING.

Not many weeks ago, an editorial note appeared in the "Gas World," commenting upon a semi-private letter which the Editor had received from the manager of a country gas-works, complaining that most of the papers read at meetings of Associations were of little or no use to the managers of small works. It is quite true that papers dealing with new departures in engineering, descriptions of large works fitted with every modern invention for conveying and handling materials, slopers *versus* horizontals, or methods of enrichment by means of carburetted water gas, oil gas, or light spirit carburettors, however interesting, are not particularly useful to the manager of the small works. Our Eastern Counties Association is composed largely of managers of small works; and this must be my excuse for selecting a subject which is as old as our profession, is probably worn almost threadbare, and upon which I am afraid I can throw very little additional light. If, however, I am able to give encouragement to any who are despondent, some hints to those who may need them, and, above all, succeed in stirring up some of our members to suggest to us new methods of obtaining business, I shall feel that I have done some little service to the Association.

The Editor said what was wanted by the manager of the small works was more education. Might we not go still deeper, and say it is more ambition that is required? The young manager placed in charge of a small works, fired with a good, honest ambition to rise in his profession, will never cease to educate himself—every difficulty he encounters and overcomes will be a vantage point from which he will obtain a broader view of the field before him, and will be a preparation for overcoming greater difficulties should they arise; and I have little doubt that every difficulty so overcome gives as true a pleasure to the earnest manager as the accomplishment of much greater work gives to his more fortunate brother who, by special training and the force of circumstances, has been entrusted with greater responsibilities. And to every manager there is surely the laudable ambition of increasing and enlarging his business.

The country manager has a great advantage over his brother in the large towns in this respect, that he is known personally to every consumer, and probably to every householder; and it is his own fault if he does not use his personal influence for the good of the business he represents. He must make himself familiar with the best types of fittings, burners, stoves, fires, and gas appliances, if possible by actual experiment; and when it is known that the manager is willing and anxious to give advice on these matters, that no amount of trouble is too much for him to take to satisfy his customers, and that his advice, if followed, is sure to give satisfaction to the recipient, he will find that his business will begin to grow. The old style of gas selling, "Take it or leave it," will not do in the Twentieth Century. We must not only court the gas consumer, we must go out of our way to win over the oil consumer also. We have gas for sale for lighting, for fuel, and for motive power. Have we done our best to place its advantages before the public, and have we given them sufficient inducement to adopt it for any or all of these purposes? A great philosopher has said: "I hold every man a debtor to his profession; from the which as men of course do seek to receive countenance and profit, so ought they of duty to endeavour themselves by way of amends to be a help and ornament thereunto."

Some time ago, a friend directed my attention to the first volume of the "JOURNAL OF GAS LIGHTING," with the remark that I should find it much more interesting reading than I anticipated. So interesting did I find it, that, with your permission, I propose to take my text, as it were, from that volume. First, however, let me say what a pleasure it was to find in the volume some well-known names of gentlemen who have contributed very considerably to the success of gas undertakings all over the world. Every maker of good appliances for the consumption of gas deserves our gratitude—every manufacturer of appliances for lessening the cost of production deserves our gratitude; and I am sure you will be glad that, even at that early date, I found, among others, the names of Sugg, Wright, Glover, Parkinson, Walker, Russell, Oakes, Bryan Donkin, Laidlaw, Harper, Moores, &c.

The first extracts I propose to give are as follows: "It is a well-known fact that the profits of a gas company depend mainly upon the quantity of gas they manufacture and supply; the question of quantity being of far more importance than that of price. . . . Quantity being admitted to be the point to be sought for and acquired, it becomes a matter for our consideration how to obtain this." The writer then goes on to give particulars of the benefits obtained by fitting up houses with proper gas-fittings at a moderate rental, and concludes his letter with these words: "No other manufacturers have placed so many obstacles in the way of the use of their commodity as gas manufacturers. First, the consumer must pay for his service-pipe, then for the meter, and finally for the gas-fittings. Supply these things free of charge, and gas will be what it is so well fitted for—the universal light." Now, please remember that these words were written over fifty years ago. What have we done since then. In quite a number of places, the words might equally well be applied to-day. I regret to say that with some gas suppliers it is still the practice to charge the customer for putting in the service-pipes. Surely one of the facilities we must offer is a free service. If the average cost of a service is £1, the interest at 5 per cent. is only 1s. per annum; while a yearly consumption of 10,000 cubic feet of gas will give at least 10s. profit. There are very few business men who would not invest £1 to secure an aunual return of 9s.

In these days, we have a great advantage over the gentleman who wrote the words I have read to you. In the penny-in-the-slot meter, we have the handiest and easiest method of dealing with the question of free fittings, or, rather, fittings at a moderate rental. The average cost of fitting a cottage with the penny meter and fittings is £3 1s., the interest on which, at 5 per cent., is 3s. per annum. The usual charge for gas consumed by means of a penny meter is 8d. per 1000 cubic feet more than the price charged to ordinary consumers; and therefore the consumer who burns 5000 cubic feet per annum is paying rent for meter and fittings. I am well aware that the penny meter is getting to be a very old song now, but I can assure you that the tune is as melodious as ever. During the quarter ended Dec. 31 last, the quantity of gas registered by penny meters in Norwich was 17,490,000 cubic feet, realizing £3539 3s. 2d.—an average of 11s. 10¼d. per meter.

There is another point which we must endeavour to attain, and that is, to see that our customers are using the gas we sell to the best advantage. It is not good for the gas supplier if the consumer wastes gas. In the matter of ordinary burners, for instance, it pays to supply the customer with the best article free of charge, and while doing so, it also pays to explain the difference between the shape of a flame which is consuming the proper quantity of gas for which the burner is designed and the shape of the flame from the same burner when gas is being wasted. The country gas manager who carries a few good burners and a small pair of pliers in his pocket is able to do a great deal of good. We know how frequently our gas suffers by being badly consumed; and we often tell people so when they complain. But a man who demonstrates this on the spot, by removing an old worn-out burner and replacing it by a good burner of moderate size, scores at once. Some of us have not yet been able to persuade the powers that be to introduce incandescent lighting for street-lamps, although I hope that before long we shall see every public gas-lamp in England fitted with incandescent light. Those of us who visited Berlin and Copenhagen with the Institution of Gas Engineers will not readily forget the splendid lighting effects we saw even in

the smallest places we passed through. But those of us who are still condemned to use the old burner in our street-lamps must see that we use the best burner and give all the light we can for the money. The street lamps are our standing advertisement; and the brighter we can make the streets, the more will the people feel the necessity for good light in their own houses. Our offices ought also to be an advertisement to passers by. Well lighted by incandescent burners, a placard might be prominently displayed: "This office is lighted by gas at a total cost of——per hour."

In the first editorial of the first volume of the "JOURNAL," there is this paragraph: "The Economic gas cooking-stove, lately registered by Mr. Rickets, is a valuable addition to his other ingenious inventions for increasing the utility and promoting the consumption of gas. At a cost of less than ¾d. per hour (gas being 6s. per 1000 cubic feet), a large family can provide themselves with fuel for roasting, boiling, stewing, and broiling at all hours without the waste of having to maintain a large coal-fire constantly burning, as the gas can be lighted at a moment's notice, and extinguished when the operation is concluded." As an advertisement for gas-cookers this paragraph has never been beaten, and with some slight adjustment of the figure stated to be the value of the gas required to perform all that is claimed, I can recommend it to you for imitation.

Now, I wish particularly to call your attention to this sentence, which follows on the heels of the one quoted above: "We hope at no distant time to see a gas cooking-stove and gas-fittings as landlords' fixtures in the humble dwellings of the working population of our cities and towns, as well as contributing to the comforts of the mansions of the rich." In a subsequent number, after calling attention to "gas-cooked repasts and ingenious lectures," with which eighteen or twenty years previously Mr. James Sharp (then of Northampton) had gratified and instructed the public, and how "we have lately witnessed the celebrated *chef* of the gastronomic art regaling his guests with a monster joint of 565 lbs. in weight, cooked in an extempore oven in five hours by 750 cubic feet of gas," the Editor makes this prophetic statement: "We have been induced to draw the attention of our readers to this subject from the conviction that therein lays the chief source of the future prosperity of gas companies." Gentlemen, I again remind you that these words were written over fifty years ago. What have the gas sellers of this country been doing since then to fulfil the prophecy? How many of us have pushed this branch of gas selling to its utmost limit? There is no gas-works, however small, where there is not room for development in this field. First, we must attract the attention of the public by a little judicious local advertisement. On the back of the gas account, for instance, an illustration of a gas-cooker, together with the terms on which it can be rented, would attract attention. In the local papers the words "Try a Gas-Cooker," or "Try a Gas-Fire —Apply to the Gas Company" would be serviceable. In the parish magazine a small advertisement is often useful. Let me suggest that in advertising something alliterative is very telling. For instance, "Cleanliness, Cheapness, Comfort" to introduce gas-fires, or "Efficiency and Economy" for cooker and gas-engine advertisements. Then there might be a small exhibit in the office, with some plain but truthful figures as to the work that can be done for a given quantity of gas. For example:—

ONE PENNYWORTH OF GAS—WHAT IT WILL DO.

CONSUMED by an ordinary gas-burner, it will give a light equal to 16 candles for six hours.

CONSUMED by an incandescent gas-burner, it will give a light equal to 45 candles for 8½ hours.

CONSUMED by a properly constructed gas-fire, it will sufficiently heat an ordinary room for 1½ hours.

CONSUMED by a properly constructed gas cooking-stove, it will cook a dinner consisting of soup, fish, joint, vegetables, and pastry, sufficient for six persons.

CONSUMED by a properly constructed water-heater, it will heat sufficient water for two hot baths.

CONSUMED by a good gas-engine, it will develop 1-horse power for an hour-and-a-half.

Occasionally there should be a course of cooking lectures, demonstrating the utility and economy of gas cooking and the value of gas as a fuel—all this to interest and attract the public. But our enterprise must not stop here. We must be prepared to coax the consumer by the offer of a stove at a moderate rental, by fixing his stove free of charge, and by giving him the best article that we can. Now, you will please observe that I do not advocate the free stove. The free stove customer is not necessarily a desirable customer. He does not care whether he uses the free stove or not; but if a customer pays a moderate rental, he endeavours to get the full benefit out of it. In the good old days, before pigtails and cocked hats had given way to cropped heads and billycocks, it is said a noted personage walked the Strand offering guineas for sale at one shilling each, and that not one was sold. If, however, some little trouble had been attached to the purchase, such as filling in an application form and obtaining a landlord's consent, people would probably have been impressed with the importance of the offer, and our friend's guineas would have had a rapid sale. That, at least, is my experience with respect to the free stove customer. In 1897 there were 1134 free stoves and 463 stoves on hire attached to penny meters in Norwich; and the average annual consumption per penny meter was 6760 cubic feet. On Dec. 31 last there were only 706 free stoves left, but there were 4097 stoves on hire attached to penny meters; and the average annual consumption per penny meter had risen to 10,495 cubic feet.

Just a word now about gas-fires. They must be of the very best construction; we must fix them free of cost; and we must not seek to make a profit on the sale of them. We are gas sellers, and should endeavour to seek our profits from the sale of gas, and not from trading in iron castings. Speaking as I am to practical men, I need not remind you that it is essential that a good supply of gas should be laid on to each stove, and that the outlet-flue should be of sufficient size, and have a good draught. Nothing condemns a gas-fire quicker than bad fixing, and that is one reason why I suggest that, by offering special facilities, we should keep this matter in our own hands. You will hardly credit it when I tell you that I have seen gas-fires where the outlet-flue had been contracted from 3 inches in diameter (the size of the maker's outlet) to 1½ inches; the theory being, as I was informed, that it "held the heat back in the fire." You can imagine the miserable failure of the fire, and the difficulty I had in persuading the suffering customer to try another. In this also we must be prepared to assist the consumer.

The advantages of gas-engines, compared with steam-engines, especially for intermittent work, must be placed before customers in the strongest possible light. I need scarcely point out that one of the strongest recommendations we can give is the use of a gas-engine by ourselves. In small works especially, the beautiful combinations of gas-engine and exhauster produced by the principal makers ought to prove an excellent advertisement. Here, again, we must offer every facility to the customer—free service right up to the engine, and, if necessary, assistance in fixing it. Gas-engines, as a rule, are day consumers; and the equalizing of day and night consumption is a step in the right direction for economy. The country manager is often the only man in the town who knows anything about gas-engines. He ought to take care that he can give good advice as to the care and management of them; and he should make himself familiar with their construction, so that he can superintend (or even execute) any ordinary repairs that may be necessary. The cleaning and adjusting of a gas-engine are often sufficient to cure what has apparently been a hopeless breakdown.

I remember a country manager who had on his committee a gentleman who, at one meeting, complained bitterly of the wretched gas then being supplied. He had a gas-engine which had run sweetly for years, but the gas then being supplied had not sufficient power in it to drive his engine. The manager visited the committee man's works, looked at the engine, pulled off his coat, and in a few hours emerged from the struggle, dirty but triumphant. The engine was running sweetly. The committee-man was asked to inspect the result, and expressed himself pleased, and inquired what the manager had done. The reply was, "Simply cleaned, and adjusted your engine." The committee man apologized for the trouble given, and remarked that had he thought that was all that was required he would have sent for a fitter. Very likely he would, when convinced; but no amount of argument could have convinced him so well as my friend's action.

Now, gentlemen, we are perhaps tempted to say, "What is the use of all this—where does the advantage come in?" I must quote my text again: "It is a well-known fact that the profits of a gas company depend mainly upon the quantity of gas they manufacture and supply." I am loth to burden you with figures, and have avoided doing so as much as possible; but I must endeavour to show how, in one or two items alone, the cost of the gas produced is reduced by the quantity supplied. In Norwich, on Dec. 31, 1897, we had 5733 ordinary and 2533 prepayment meters, and the gas sold for the half year was 138,491,000 cubic feet. On Dec. 31 last, we had 6117 ordinary and 6194 prepayment meters, and the gas sold was 174,373,000 cubic feet. Excluding the cost of the raw material, the cost of manufacture for the half year ended 1897 was 9·7d. per 1000 cubic feet of gas sold, while in 1900 it was only 6·3d. What one may describe as standing charges (rates and taxes and management) were reduced by 0·9d., and the amount required for dividend was reduced by 2·1d. per 1000 cubic feet sold—a total saving of 6·4d. per 1000 cubic feet sold, due almost entirely to increased consumption. The only items not affected will be the cost of the raw materials for gas production. Increased output effects economy everywhere else.

The introduction of cooking-stoves and gas-engines has given greater uniformity to the demand for gas. The difference between June and December is not nearly so great as formerly—*e.g.*, the gas sent out in June, 1890, was only 27·6 per cent. of the quantity sent out in December, 1890; whereas the quantity sent out in June, 1900, was 47·6 per cent. of the quantity sent out in December, 1900. Again, the day consumption and night consumption are more uniform. In June, 1890, the day consumption was 47·7 per cent. of the night consumption; whereas in 1900 it was 102·9 per cent. Or, to put it in another form, the day consumption for a week in June, 1890, was 1,005,000 cubic feet, and the night consumption 2,103,000 cubic feet; while in the corresponding week in 1900, the day consumption was 2,505,000 cubic feet, and the night consumption 2,434,000 cubic feet. This, you will readily perceive, promotes economical working.

It is sometimes argued that, as increased day consumption means increased day pressure, therefore the unaccounted-for gas will be largely increased. This, however, is not our experience. In the half year ended Dec. 31, 1897, the gas sold was 138,491,200 cubic feet, and the unaccounted-for gas was 12,618,700 cubic feet; while in the corresponding half of 1900, the gas sold was 174,373,400 cubic feet, and the unaccounted-for gas 12,229,500 cubic feet.

Most of us, at times at least, are tempted to bemoan the mean.

ness of our opportunities, the insignificance of any results that are likely to accrue from our efforts, and are inclined to sit down and dream of the great deeds we could have done had greater scope been given us. When we feel in this frame of mind we must arouse ourselves, for we are confined in a miserable shed called Despondency, in the purlieus of Doubting Castle, guarded by a ragged, tattered lout named Laziness, a myrmidon of Giant Despair. We need not be there long. One vigorous kick at the ramshackle walls, and we are free—free to breathe the fresh, wholesome air of hard work, and enjoy the sunshine of duty done.

As I have already pointed out, each one of us owes a debt to the profession he has chosen, a debt that can only be paid by endeavouring to leave our works and our businesses better than we found them; and this debt is as truly binding upon the manager of the small works as upon any other member of the profession. The satisfaction of having faithfully discharged one's duty is attainable by every one, no matter whether his responsibilities be great or small.

> "Who does the best his circumstance allows
> Does well, acts nobly; angels could no more."

Discussion.

[The discussion was carried to a great length; and the following report is confined to the salient features.]

The PRESIDENT commented upon the excellence of the paper, and expressed the opinion that all who had heard it must have enjoyed it.

Mr. W. J. CARPENTER (Yarmouth) also congratulated the author upon the character of the paper. Mr. Young, he said, came to them as a big gas-selling man; and he (the speaker) thought Mr. Young's reputation had been well sustained by the figures he had given them. He did not intend to keep the members long; but he had present some diagrams which Mr. Young had asked him to bring to the meeting, and which he thought would illustrate some portions of his paper, because he believed that at Yarmouth they followed well on the same lines as those adopted at Norwich in regard to the selling of gas.

Mr. YOUNG said he might say that he saw these beautiful diagrams when visiting Mr. Carpenter; and as they referred to some of the points about which he had spoken in the paper, he asked Mr. Carpenter to be good enough to bring them to the meeting, as he (Mr. Young) was sure they would be of interest.

Mr. CARPENTER explained the diagrams, which were handed round. They showed the position of the gas consumption in Yarmouth during the period from 1887 to date. In 1887, the day consumption was 26 per cent. of the total; and in 1900, 40 per cent. There has, said Mr. Carpenter, also been a steady total increase from 1887 to date; and since the introduction of electric lighting by the Corporation in 1894, the advance in gas consumption has been more marked. That lighting by gas still continues popular is evidenced by the fact that there is a steady increase in night consumption. The diagrams show that, even without the increase due to day consumption, there is a respectable growth of business owing to the gas used for lighting purposes.

Mr. C. PANCHEN (Yarmouth) remarked that the paper was much to the point. Possibly, the advice given would be new to some of the smaller gas companies; but in Yarmouth they had been working on the lines that had been more or less noted by the author. One matter of difficulty sometimes arose from pressing cooking and heating stoves upon consumers; and that was that they afterwards came and worried the poor Secretary regarding the enormous increase in the gas bills. The consumers did not appear to expect their bills to increase in the ratio of the comfort provided by the articles named. It was therefore sometimes a neat and close point to convince them that the gas had been used, and that the amount of comfort that should have been derived from the stoves had actually been brought about. By a strange coincidence, when the writer of the paper dropped into his office in a most casual way a short time since, he (Mr. Panchen) had such a case before him. A consumer came in, and told him there was not the least shadow of a doubt that he had consumed a smaller quantity of gas in the quarter ending Lady-day than in the quarter from Michaelmas to Christmas. He brought his bill and all sorts of figures to show that the meter was wrong. This was his impression when he came into the office; but on seeing the figures in the ledger and the figures the consumer brought with him, he (the speaker) was successful in making his irate friend more amenable to reason. After he had gone, Mr. Young said, "He seems to have gone out of this office a more contented consumer." It was not likely that it would always be his lot, or the lot of other members, to have such a reasonable man to deal with; but in this particular case it was his happy lot to please the consumer in question.

Mr. T. O. PATERSON, the President of the Gas Institute (who was applauded on rising), remarked that the subject dealt with was one at which they were all working year by year. He thought it was one of the most interesting problems in connection with a gas department as to how they could get more people to consume gas for lighting, for heating, and for power purposes. The introduction of the prepayment meter, of course, had made a vast difference to their manufacturing operations. In his own case, when they first commenced this prepayment business, they had about 7000 consumers, whereas they had now about 17,000. He noticed also some little time ago that their consumption was just double what it was at the time they introduced the system—that was, over the whole year; but, taking the day consumption alone, it had risen to five times what it was when they first commenced. This day increase was due entirely to the pushing of stoves for cooking and heating. They granted these stoves on as easy terms as possible with regard to fixing and all that kind of thing. He thought a very important part of Mr. Young's paper was where he urged them not to put any obstacles in the way of getting consumers—that was, to pay for this and pay for that themselves. What they ought to do was to get their profit out of the gas; and all the other things they ought to do themselves just the same as was done in other businesses. They had no right to make a profit out of cast iron, or any of the fixings, even if they sold them to the consumer. The question was, how to get more consumers. In any town the number of consumers was small compared with the number of houses. It did not matter whether the electric light was in a house; they should get that house for a cooker or heater, or both. Such houses were usually good consumers for cooking and heating purposes. He thought Mr. Young's paper was a most valuable one; and they would read it with a great deal of pleasure and interest when they got back to their homes.

Mr. J. T. JOLLIFFE (Ipswich) observed that wisdom seemed to permeate every sentence of the paper Mr. Young had read to them. He was pleased the author had started with the word "ambition." It should be the ambition of them all to do the best they could for the positions they occupied; and he did not think anything could add greater success to their undertakings than to push the sales of the product which they manufactured, and to do it on broad and liberal lines. He was strongly of opinion that the best way to do this was to try, as far as practicable, to get the gas-fitting in their own hands, in order to get in touch with the consumers. It was not possible in all towns for the gas manager and engineer to make himself personally known to every consumer; but it was possible to make their subordinates known if the gas-fitting was undertaken by the gas suppliers. In Ipswich, they found this was of great importance to them. They had a large number of fitters, whom they educated in as enlightened principles as possible, in order that they might try to draw out the complaints of consumers, if there were any. In one part of his paper, Mr. Young told them that the average cost of fitting up a cottage was £3 1s. The figure struck him (Mr. Jolliffe) as being phenomenally low; and he should like to know what was given for this amount. At Ipswich, they had, in common with most other gas undertakings, a large number of these prepayment consumers; but they had not been able to get their figure down to £3 1s. They had not, in fact, been able to get down below £4, or thereabouts. But perhaps they had been a little more liberal than Mr. Young. They gave the consumers four burners and a boiling-ring—their object being to get gas into every room of a cottage. He held rather strongly that, if they could abolish the oil-lamp altogether, they would really have better results over the whole; and this was borne out by his experience. Mr. Young stated that he got an average consumption per house of 10,495 cubic feet. This was good; but it was not so good as they obtained in Ipswich, because they had an average of quite 13,000 cubic feet. This he attributed to the fact that they had dealt liberally with the slot-meter consumers—in all cases, as he had said, providing them with four burners. If more were needed, the consumers had to pay the Company something. By this means he thought they had wholly kept out the oil-lamp. The advantage of these slot-meter consumers, so far as his knowledge went, was this, that their consumption was fairly uniform throughout the year; and paradoxical as it might appear, the amount of gas consumed by them was almost as great in June, July, and August as it was in December, and the smallest consumption was in May. This had been the case with them ever since they started in Ipswich. He was in accord with every word Mr. Young used in the paper as to replacing worn-out burners by new. They carried it out at Ipswich with their slot-meter consumers by providing them with a good governor burner, solely with the idea that they should not be able to waste the gas, and so accuse the Company of giving them a commodity that was not worth the money they paid for it. He congratulated Mr. Young sincerely on the work he had done in Norwich; and he hoped he would go on and continue to prosper.

Mr. J. DAVIS (Gravesend) was pleased to see that Mr. Young advocated what he had been advocating for the last ten years in Gravesend—that was the laying on of service-pipes and fixing meters free of cost. He (Mr. Davis) had at last succeeded in getting his Directors to do this. He also was about to call attention to the average cost of fitting a cottage in Norwich on the prepayment system. It seemed to him that £3 1s. was a very small amount. The usual charge in Mr. Young's case for gas consumed by the slot meters was 8d. per 1000 cubic feet more than the ordinary price; but at Gravesend they reckoned to get 10d. per 1000 feet. Taking the average cost of fitting up at £4 15s. per house, the 10d. was, including depreciation, a very fair interest to charge for the hire of the meters and fittings. His experience went to show that good results might be obtained with shilling-in-the-slot meters. He believed he held the record for consumption by a shilling slot-meter. They had one consumer from whose meter they had taken £44 12s. in twelve months! The consumer was perfectly satisfied; and so was he (Mr. Davis). Mr. Young proposed exhibiting in the gas office a placard, stating that "This office is lighted by gas at a total cost of —— per hour." He (Mr. Davis) did not think that would answer. It might have the result of causing consumers to complain, and saying: "There is

evidently something wrong with my meter, and you will have to take something off my bill." He quite agreed with Mr. Young as to advertising, and was carrying it out to a large extent by advertising with alarming headlines, in order to draw attention. The more they advertised, the better it would be. He also thought the examples of what a pennyworth of gas would do would be very useful if hung up in the show-room window; and he agreed with what the author said there. Mr. Young was to be highly commended for the increase in his gas sales at Norwich. He seemed to have done exceedingly well; and he (Mr. Davis) should like at this point to congratulate Mr. Carpenter not only on his admirable diagrams, but also for the work he had accomplished at Yarmouth. To have the day consumption almost equalling the night consumption was a grand thing, because they knew that, if their plant was doing work in the daytime, it was naturally decreasing the expenses on capital account.

Mr. R. G. SHADBOLT (Grantham) believed they were all very much in the same boat at the present time in regard to the matters dealt with in the paper. There was no doubt a great change had come over the attitude of gas authorities towards their consumers in the past decade. He could not help thinking, while listening to the paper, of instances which had come under his own notice, which proved that it was really surprising what a little "judicious alteration in policy would do. He had in mind a case where cookers were let out at a reasonable rate of hire; but unfortunately they were left in the consumers' hands to be fixed as they thought fit. This was a stumbling-block; and directly it was removed, the number of cookers multiplied almost twenty times in a couple of years. He believed it was the fashion now to provide free burners; and he had even heard it suggested that the time had come when they should provide free incandescent burners. If it paid them to do this in the gross result, they must take it up. There was no doubt that the time had arrived when they must cultivate their consumption to the utmost of their ability. Mr. Young had struck to the heart of the question when he said that they must have a greater quantity of business to deal with, that a greater amount of money must pass through their hands, and that a greater amount of work must be got out of their plant and themselves too. He congratulated Mr. Young upon having applied his principles so well, and upon the result he had achieved thereby.

Mr. C. ELLIS (Yarmouth) endorsed the author's remarks as to laying free services. At Yarmouth, it had been their practice for years. He might mention one case where, through the liberality of the Directors, they laid free 450 yards of 4-inch main to supply one gas-engine. The result had been that since then the same firm had fixed four other engines; and the Company were now getting £250 a year rental for their outlay.

Mr. ALEX. MITCHELL (Bury St. Edmunds) pointed out that Mr. Young had made no reference to the electric light, and how they should treat it when it came before them as an opponent. In his town, they had the electric light; and it was his opinion that the worst form of this competition was where they had corporation electric light against a gas company's gas. In such a case they had to contend with people who were supplying an article at a figure which, one was almost inclined to think, was less than cost price; whereas they had to supply their gas at a reasonable profit. His view was that, when a consumer came to them and said he was going to give up gas, and take on the electric light, they ought not to jump on him at once, and say "You are making a mistake." But they should reason the matter out, and agree sometimes that the electric light was a good light; and, for the consumer's particular class of business, it might be. The "man in the street" knew what he wanted; and they would not drive it out of his head if they were unreasonable. But if they dealt with him reasonably, they could convince him that he could light cheaper by gas than by electricity. They must yield to him, and even agree that for certain purposes the electric light, though not cheaper, might be better than gas. If they ran down his electric light, they would set him against them, and might not secure his good will for some time again. "Don't," said Mr. Mitchell in conclusion, "run your opponent down. Rather give him credit for what he can do; but at the same time urge what you can do."

Mr. J. WITTEN (Southtown, Yarmouth) said one thing he looked for in the paper was a reference to canvassing for customers. He had proved by experience that the results of working in that direction were good. At one time their average increase in a year was about six new consumers. The first year he commenced to canvass they had an increase of 150 new consumers; and they had since been advancing at the same rate each year. Before canvassing, the number of cookers was increasing by about six per annum; but afterwards in the first year he fixed 50, the next year over 60, then over 80, and last year 150. This had all been done by canvassing.

Mr. J. CARTER (Lincoln) was glad that in the paper there was no indication that Mr. Young favoured in the slightest degree what had been often too readily conceded on the part of gas manufacturers and sellers—that the future of lighting belonged necessarily to the electricians. He (the speaker) was well assured of the fact that—with gas undertakings managed with efficiency and economy, and conducted on the lines of strict commercial common sense—gas held the field to-day for lighting as well as for heating and cooking, and was likely to do so for many years to come if gas managers stood up to their duty, and faced it in the way they ought to do. Twenty-five years ago, the electric light was "the light of the future;" to-day it was the same; and how long it would have to be content with that position rested very much upon gas managers. The development of the gas business depended upon selling their commodity at the lowest possible price. So long as they could sell gas cheaply, there was no fear at all that they would not experience a growth and development such as they at any rate had had during the past few years. They had had many valuable contributions at their technical meetings, dealing with economy on the works and economy in the handling of materials. The writers had spoken of 6d., 9d., and even 1s. saving per ton of coal carbonized in the retort-house expenses; and these things had assumed an importance in the minds of gas engineers which they no doubt deserved. But let them for a moment refer to the startling figure Mr. Young had given them. Supposing they could effect a saving of 1d. or even 2d. per 1000 cubic feet in the expenses on the works, how did that compare with the saving of 6·4d. per 1000 cubic feet which Mr. Young clearly showed might be taken as a reduction that was due entirely to the automatic increase in the quantity of gas dealt with? This 6½d. per 1000 cubic feet was a startling figure, and one they might well ponder over. If this did not provide sufficient stimulus to find out every possible means of increasing consumption, then, he said, the logic of fact and figure must be lost upon them entirely. With regard to grumbling consumers, one point occurred to him. He did not think they would have to meet so many cases of complaints of extravagant accounts if it were not for the statements made by manufacturers of gas appliances. For instance, it would be much better for gas suppliers if the makers of gas-fires and popular burners—instead of testing at 10-10ths pressure, and saying these appliances would consume so much per hour—would test them at the ordinary pressures obtaining in the town, and say exactly what the consumption would be. Then there would not be so much disparity between the statements of the manufacturers and the quarterly gas accounts.

Mr. W. D. CHILD (Romford) said the discussion revealed a unanimity of feeling that business could be obtained if they only devoted themselves to supplying the wants of the consumers. So far as he was concerned, he had an excellent Board at his back; and they enabled him to do everything possible to obtain the patronage of the inhabitants of the town. They had free services, cookers fixed free, and prepayment consumers had cookers included. He was not at all satisfied they were doing a wise thing in connection with the free cooker; and Mr. Young appeared to fight shy of it. If the consumers had only to sign an application form and to pay a small fee for (say) the first year, they would then only be called upon to put stoves in places where they would be doing ordinary work. Regarding the question Mr. Carter alluded to, as to the reduction of 6½d. per 1000 cubic feet in costs through supplying an increased quantity of gas, that figure might be obtained where the works were excellently equipped with manufacturing appliances and storage; but where the Directors devoted themselves mainly to the cultivation of business, and ran to any extreme to secure custom, while they kept a tight hand over capital expenditure on works both for producing gas and storing gas, then the manager had sometimes an uneasy task, when the winter commenced, to supply this increased consumption. He wished directors of gas undertakings could attend their meetings, and understand the zeal and energy their representatives were willing to put into their businesses, then he thought they would readily supply the capital necessary to carry on the work.

Mr. E. W. SMITH (Chelmsford) remarked that the paper was entitled "Hints on Selling Gas;" but the discussion seemed to have run more particularly on gas cooking-stoves and fires, and little had been said about the small consumer. In the case of gas undertakings not subjected to the competition of the electric light, and gas undertakings situated near London, there was no difficulty in obtaining consumers. But where a company in an ordinary provincial town had against them the severe competition of the electric light, the consumption of gas did not increase so rapidly as the engineers and directors would like it to; and it became a question how to keep the consumption up to even its normal state. The small consumer seemed to him to offer a good, if not perhaps the best, field for them; and he did not know that the small consumer was not more desirable than the large one—for this reason, that the large consumer probably received some consideration in price, and if the electric light was introduced into the town, he required a good deal of pampering to keep him, and when eventually he did go away, the difference to the gas company was considerable. His contention was that, with a large number of small consumers, the gas company were in a much better and stronger position, than with only a few large ones. He should like to ask Mr. Young if his stoves, fittings, and services were paid for out of capital or revenue, because it seemed to him the 6·4d. per 1000 cubic feet was a big saving; and he could only think it was brought about by the work being paid for out of revenue.

The PRESIDENT said that at Spalding, by introducing stoves and fires, they had almost doubled their consumption of gas in ten years. They did not hire out stoves; but they supplied them at cost price, and fixed them free. People readily bought the stoves when supplied on these conditions. The fixing of the stove often cost as much as the stove itself; and the Gas Committee bore the expense. They had now at least 250, perhaps 300, cooking-stoves in use, all of which belonged to the gas consumers, who consequently took great care of them. Regarding the prepayment meter business, they had not done very much; having only about

200 consumers of this class. Two lights and a boiling-burner were supplied free; and the prepayment consumers were charged at the same rate per 1000 cubic feet as the ordinary consumers—that was, 3s. 4d. gross, and 1d. in every 6d. was allowed as discount, which brought the price down to nearly 2s. 6d. This paid very well indeed. They charged themselves with £4 10s. for the installation. They put the meter down at £2, took the average cost of the service at 10s., and they paid the gas-fitters £1 per house. On the outlay, the department were entitled to 10 per cent. to cover interest. They wanted this 10 per cent. over and above the 2s. 6d. per 1000 cubic feet, which was the net cost of the gas to the ordinary consumers.

Mr. YOUNG, in reply, expressed first his gratitude for the kind reception accorded to the paper. Mr. Jolliffe had asked a question as to the cost of fitting up cottages. He did not include in the figure the cost of the service, as they would have to put that in in the case of any consumer. He included in the £3 1s. the slot meter. They did not draw the line at any number of fittings—they were, in fact, very anxious to fit up every room; but if the householder would only let him fit up the living-room and a stove, he was content to put in a slot meter for that. Mr. Jolliffe's remark that, if they could do away with the oil-lamp, they were doing a good thing, was perfectly correct, because the lamp could be carried about from room to room. In Norwich, they had managed to persuade 3300 people in cottages that the proper thing to do was to have fixed burners and cookers. The details of the complete outfit were: Slot meter, £2 2s.; stamping fee, 6d.; lock and key, 6d.; pendant, 3s. 7d.; three brackets, 3s. 1d.; four blocks, 7¾d.; four nose-pieces, 7¾d.; 54 feet of compo., 4s. 6d.; labour, 5s. 1d. These items ran out to £3s. 0s. 6d. Perhaps Mr. Jolliffe included something more in his estimate. [Mr. JOLLIFFE: I include the service.] He thought that would bring them on all-fours. He must congratulate Mr. Jolliffe on his large average consumption of gas by slot meters. In the country, 10,000 cubic feet was considered a very good average indeed; and it must be remembered that Ipswich was a manufacturing town where the working men had a little more money to spare than in many other places. Mr. Child spoke of the difficulty of increasing the capital account. As a matter of fact, the quantity of gas sent out in December in Norwich was now less than it was ten years ago. The increase had been entirely in the summer months; so that the same plant and the same storage power met the increased consumption without any capital expenditure whatever. He had had to fight the electric light both under corporation and company control; and he thought most gas managers could snap their fingers at any corporation supply—the company supply was a much more dangerous enemy. In Norwich, the electric light people had slot meters just the same as the Gas Company; and they got the electric light into houses of a rental of £12 10s. per annum. He agreed with Mr. Smith's remarks respecting the cultivation of the small consumer; and, in reply to his last question, he might state that new stoves, new services, and new meters were all paid for out of capital. Mr. Child had said that they must be careful to supply the wants of the consumer. They must go further, and create those wants; they must convince the consumer that he had those wants. That was, in his opinion, really the secret of gas selling.

On the motion of Mr. R. BROWN seconded by Mr. T. A. GUYATT (Ely), a hearty vote of thanks was passed to Mr. Young for his interesting paper.

ARSENIC IN COKE.

The HON. SECRETARY said, according to the programme, they had arrived at the point where the "question-box" should have been introduced; but as Mr. Young's paper had had such a full discussion, having been on such an important subject, he was afraid they would have to abandon the question-box on this occasion. Mr. Young had, however, kindly undertaken to bring before the members another subject—viz., "Arsenic in Coke." As they were all aware, there was a Royal Commission sitting to inquire into the question of arsenical poisoning by beer, and at that inquiry coke had been very severely condemned as fuel for the making of malt. In Newmarket, they had several maltsters, who had objected to take their coke. This was not a single instance; several gas companies were suffering from the condemnation of coke in consequence of the alleged largeness of the quantity of arsenic it contained. His Company were members of the Gas Companies' Protection Association; and he wrote to the Secretary suggesting that they should take the matter up, and bring rebutting evidence before the Royal Commission. This they had consented to do, and had to that end invited members to have their coke tested. His Company had had their coke examined by the County Analyst; and from his analysis they found that the coke (which was a product of South Yorkshire coal) contained less than $\frac{1}{50}$ grain per pound of coke, which amount of arsenic, the Analyst said, could have no possible effect on malt made by this coke. Mr. Young had also instituted some tests, and had with him samples of the results of the tests which he would hand round the room.

Mr. YOUNG remarked that, when the President and Secretary visited him a few weeks ago, this question of arsenic arose; and he undertook to have a series of tests made at his works for arsenic in coal and coke, and also from different parts of the charge. His assistant (Mr. Moon) had prepared a short report on those tests; and, with the President's permission, he would ask him to read it. Mr. Moon had also prepared a few specimens of arsenic mirrors, showing the amount of arsenic produced on glass tubes by 5 grammes of the different material tested. His assistant was a very clever chemist; and he (Mr. Young) should like the members to hear his tale from his own lips.

Mr. PHILIP G. G. MOON, F.C.S., presented the statement of the results of the tests, in the following words:—

As Mr. Young has intimated to you, he anticipated that the question of the presence of arsenic in coke would arise at this meeting. As the question is so important to many who sell coke for malting purposes, and as already the arsenic "bogie" has materially affected the spring coke sales, Mr. Young suggested that it might be interesting and helpful to institute a few experiments, to see how far the outcry of the maltsters and brewers against gas coke was justified. The result of these experiments I now lay before you. There are many methods for estimating traces of arsenic in suspected substances, each of which has its own particular advocates.

The method adopted in the following estimations is briefly as follows: 5 grammes of the finely powdered sample is treated with strong nitric and sulphuric acids; and after evaporating on the water-bath, is extracted with water, filtered, and the filtrate tested in Marsh's apparatus in the usual way. The arsenic mirror obtained is either weighed or compared with standard mirrors.

A sample of Durham coal taken before charging a particular retort, and treated by the above method, gave 0·012 per cent. of arsenic, or 0·84 grain per pound. After carbonizing, samples of the coke were taken—one from the middle of the through retort, and one from the mouthpiece end of the charge. A sample was also taken of the dust and droppings from the ascension-pipe. The sample of coke from the middle gave a trace of arsenic, which, although distinctly visible, was yet too small to affect the balance, and was therefore less than 0·001 per cent., or 0·07 grain per pound. The mouthpiece sample gave 0·003 per cent., or 0·21 grain per pound; and the ascension-pipe dust 0·006 per cent., or 0·42 grain per pound.

From this it would appear that from coal containing even a fairly large trace of arsenic, coke is produced containing a quite unimportant trace. Also, as might be expected, the better the charge is carbonized, the smaller the trace of arsenic in the resulting coke. Roughly speaking, 70 lbs. of fuel are required to produce 8 bushels of malt; and the 8 bushels of malt produce 144 gallons of beer. So that barley malted by coke containing 0·10 grain of arsenic per pound, even assuming that every trace of arsenic is retained by the malt (an assumption probably far from correct), would produce beer containing only 0·05 grain of arsenic per gallon. As the smallest dangerous dose of arsenic is 2 grains, we see that it would be necessary to drink 40 gallons to be dangerously affected by the above beer.

Yet, as we have seen, it is easy, even from a somewhat arsenical coal, to produce coke containing considerably less than 0·10 grain of arsenic per pound. The next coal examined was a washed Yorkshire nut. This contained only 0·006 per cent., or 0·42 grain of arsenic per pound before carbonizing; and the resulting coke contained a trace so small as to be practically negligible.

A sample of anthracite (the substitute for gas coke) was examined, and contained a decided, though immeasurable, trace of arsenic. The arsenic mirror from the anthracite was more marked than that from the nut coke, but somewhat less than that from the Durham coke. Apparently, therefore, it would appear from these experiments, that the outcry against gas coke is quite unwarranted, and that, moreover, the substitution of anthracite, at any rate from an arsenic point of view, is not only unnecessary but futile.

In conclusion, it is interesting to compare the small traces of arsenic found in the above samples of coke with the amounts found in the samples of sulphuric acid that wrought such havoc in the North. Dr. Campbell Brown gives these latter as follows: "Percentage of arsenic found in the sulphuric acid supplied to Messrs. Bostock, 1·92, 2·36, and 2·5 per cent." This represents from 150 to 170 grains of arsenic per pound of acid—a fearful percentage. Compared with such figures as these, the insignificant traces found in the samples of coke examined above place those samples on a level of practical purity.

[The interesting mirrors referred to were handed round.]

The PRESIDENT said, on behalf of the members, he had to thank Mr. Moon, through Mr. Young, for his valuable addition to the day's transactions. They did not expect such a contribution as this; and he was sure all the members would study it very carefully at home when they had it in print. Personally, he thought it would set at rest the doubt as to whether or not coke was suitable for malting purposes. As they all knew perfectly well, coke had been used for malting for many years; and had it not been for the unfortunate affair in the North, nothing would have been heard about the question so far as gas coke was concerned.

The members very heartily endorsed the President's remarks as to the thanks due to Mr. Moon.

NEW AND OLD OFFICIALS.

Mr. J. CARTER (Lincoln) said it was his privilege to propose the President's successor; and when he mentioned the name of Mr. R. Brown, of Cambridge, he was sure the members would all recognize in him a gentleman who would fully maintain the honour and dignity of the position.

Mr. JOHN BARTON (Peterborough) seconded the motion which was cordially agreed to.

Mr. H. WIMHURST found equal pleasure in proposing, and the HON. SECRETARY in seconding, that Mr. E. W. Smith, of Chelmsford, succeed to the office of Vice-President rendered vacant by the elevation of Mr. Brown.

The proposal was heartily passed.

Mr. SHADBOLT moved the re-appointment of Mr. Troughton as Hon. Secretary and Treasurer. He referred to the great amount of work Mr. Troughton had to do for the Association, and to the conscientious manner in which he performed it.

Mr. ARTHUR GRAHAM seconded; and the motion was carried with marked approval.

Mr. J. DAVIS followed with the proposition, which was seconded by Mr. W. J. CARPENTER, that Mr. C. Ellis and Mr. C. Panchen be re-elected Auditors; and it was also agreed to.

On the motion of the HON. SECRETARY, seconded by the PRESIDENT, Mr. E. J. Brockway and Mr. J. Young were appointed to serve on the Committee for the ensuing two years.

THE AUTUMN MEETING.

Mr. WIMHURST moved that the next meeting be held at Cambridge; the date to be left to the decision of the Committee.

Mr. SHADBOLT, in seconding, remarked that the reason it was proposed to leave the date to the selection of the Committee was in order that the meeting should not clash with the International Engineering Congress in Glasgow.

The motion was adopted.

WELL-EARNED THANKS.

Mr. CARPENTER proposed a vote of thanks to the President for his services in the chair. Mr. Hawkins, he said, had risen to the occasion in every possible way, and had fully maintained the dignity of the position and of the Association.

Mr. JOLLIFFE seconded the motion with pleasure, and at the same time he asked to be permitted to propose a similar vote to the officers. They had all done good work in connection with the Association; and the last meetings had been most enjoyable.

Mr. SHADBOLT seconded the motion.

Both proposals were heartily agreed to.

The PRESIDENT, in responding, observed that during his year of office he had tried to do his best; and if he had succeeded in doing anything to assist the Association, or in affording interest to the members, he was well pleased. He had tried to do all he could; and no one could do more.

This concluded the business meeting.

In the evening, the Chairman and Directors of the British Gaslight Company honoured the Association by entertaining them at dinner. The hosts were represented by Mr. H. B. Chamberlain, the Secretary of the Company, and Mr. Young; and the table was very liberally spread. This evidence of interest on the part of one of the leading Eastern Counties companies in the work of the Association, suffused the event with a feeling of geniality which produced happiness and satisfaction rarely exceeded on such occasions. Hearty recognition was made of the kindness of those who provided the pleasure; and if good wishes alone sufficed, then the continued growth of the Company's prosperity in Norwich would be fully assured. In the course of the toasts, some references were made to the subject of the amalgamation of the Institution and Gas Institute by Mr. T. O. Paterson, the President of the latter, and Mr. J. Davis, the Hon. Secretary. The former did not see that there was anything insuperable in the way to a re-union; and the latter expressed the hope and belief that the amalgamation would eventually become an accomplished fact, with the full retention of the present members of the Institute.

MANCHESTER AND DISTRICT JUNIOR GAS ASSOCIATION.

The Monthly Meeting of the Association was held on Saturday, at the Manchester Technical School—Mr. CLARENCE BERRY, of Hyde, presiding.

Messrs. Hargreaves (St. Anne's-on-the-Sea), Townsley (Ashton), and Tagg (Birkenhead), were elected members.

It was announced that, by the courtesy of the Managers of the Staveley Coal and Iron Company, Chesterfield, arrangements had been made for the Association to pay a visit to the works of the Company on the 22nd of June.

The VICE-PRESIDENT (Mr. R. H. Garlick) remarked that he had himself had an opportunity of inspecting the Staveley works, and had been particularly interested in their special arrangements for casting pipes. The works were well equipped throughout, and he was sure the visit would prove most interesting.

Mr. GARLICK, as Vice-President, then took the chair, and said he had pleasure in calling upon their President, Mr. Berry, to read a paper which he had prepared on "The Standardization of Meter-Unions." This was an important question, and possibly the discussion might lead to some movement being started for securing the uniformity in meter-unions which was so desirable.

Mr. BERRY then read the following paper:—

THE STANDARDIZATION OF GAS-METER UNIONS.

Although the question of the standardization of meter unions may be classed among those designated hackneyed or threadbare—having probably been discussed before every association of members of the gas industry in the British Isles—no apology is needed for an attempt to add another discussion to the many, for the simple reason that the subject is of such importance that it should be revived on every possible occasion until some practical result has been obtained. Those who studied the tables compiled by Mr. J. F. Bell, and published with his paper on this subject read before the Midland Association of Gas Managers in November last, could not avoid being struck by the ingenuity displayed by meter makers in the devising of original threads for unions; and it seems to be somewhat strange that, after the subject has been repeatedly discussed for so many years, and that so far back as 1891 the Standards Department of the Board of Trade stated that a standard gas-meter union was desirable, there is still no recognized standard, and the only result up to the present is that the makers in one city (Edinburgh) have decided upon a standard union for dry gas-meters only. For this first step in the right direction, thanks are due to Mr. J. Napier Myers, of Saltcoats, for his untiring zeal in keeping the subject ever green.

It is pretty generally admitted that the existing great diversity in diameter and pitch of thread of meter-unions is a source of much trouble and expense, and that a standard union would be a boon and a blessing to the gas industry. Consider for a moment what would be the result if each of the makers of wrought-iron tubes adopted a different pitch of thread. Every gas undertaking would have to stick to one tube manufacturer, or the result would be utter confusion. Now if it is possible and advisable for all the makers of gas, galvanized, and steam tubes to adopt a standard pitch of thread, is it not also possible and advisable for all meter makers to adopt a standard union?

From the point of view of economy, take the case of an undertaking whose meter changes average a dozen per day. Were the unions interchangeable, each meter could be changed in a few minutes; and one fitter and apprentice could comfortably change the dozen in the various parts of the district in a day. But under existing conditions, in 50 per cent. of the changes the unions are not adaptable, which means that the compo. must be cut and new joints made. In some cases this is not a tedious job; but it often happens, in these days of economy of space, that the meter is in an awkward corner, and the working space so limited as to render the making of joints a laborious task to the workman. And if, as is often the case, there are two or three branch joints near the outlet-union, it generally happens that these also have to be cut and re-made—again adding to the time required for the completion of the work. To such an extent is this the case, that a fitter and apprentice, instead of getting through the dozen changes in a day, are only able to manage about half that number. If this be accepted as a working basis, it means that, under existing conditions, every gas undertaking has to employ two meter-fitters and two apprentices to do the amount of work that could be done by one meter-fitter and one apprentice were meter unions made to a standard. Taking the fitter's wages at 30s., and the average of the apprentice's at 10s. weekly, this works out to a loss of £104 a year in the case of the undertaking under consideration.

To take another illustration as to convenience. The manager of an hotel or other business premises on attempting at dusk to light up his establishment, finds that the burners refuse to yield gas. He spends half-an-hour putting water into the meter, letting it out again, shaking the meter, &c.—all to no purpose. He then sends to the gas-works, and a fitter arrives who spends another half-hour, and with the same result; the meter is done and refuses to pass gas. Now if the gas undertaking have a meter in stock of the same size and with similar unions, the meter can be changed in a few minutes and business resumed. But if the unions refuse to adapt themselves, it is more than likely that, by the time the meter is changed and new joints made, it is closing time, and the owner of the business has suffered a serious loss.

The question, which often crops up during the discussion of this subject, as to whether it be desirable to reduce the number of sizes of diameters of unions, is well worthy of consideration. In the twelve sizes of meters from 2 to 100 lights, there are now nine different diameters of unions—viz., ½, ⅝, ¾, 1, 1¼, 1⅜, 1½, 1¾, and 2 inches. It is the prevailing custom to work these nine sizes of unions with six sizes of compo.—viz.,

In.	In.	In.	In.	In.	In.	
½	⅝ & ¾	1	1¼	1⅜ & 1½	1¾ & 2	unions.
½	¾	1	1¼	1½	2	compo.

Would it not be mutually beneficial to the meter maker and the gas engineer to reduce the number of diameters from twelve to four, according to the following scale:—

Lights.	Lights.	Lights.	Lights.	
2, 3, 5.	10, 15.	20, 30, 40, 50, 60.	80, 100	meters.
¾ inch	1 inch	1½ inch	2 inch	unions.

This would mean that the makers, instead of having to make twelve sizes of unions, would only need to make four sizes; and when the many processes through which a union passes in the course of its manufacture from the metal to the finished article are taken into consideration, it is not difficult to realize the resulting economy in patterns, tools, &c. On the other hand, the gas engineer, instead of stocking six sizes of compo., need only stock four sizes. As before stated, this is a part of the whole subject worthy of consideration; but it is in no way so vital as the main question of the standardization of threads.

It has also been suggested that the different makers' meters of similar capacity should be made to standard dimensions. There

is no doubt whatever that this would be a convenience. But it is an open question as to whether the convenience to the gas engineer would be of such a nature as to warrant the expense of the change to the manufacturer; and rather than endanger the attainment of the main object, perhaps it would be policy not to push this idea. It might be a case of losing the substance while grasping the shadow.

Much has been said as to each engineer ordering his meters with unions made to his own standard. This may be a way out of the difficulty with respect to large works whose orders make it worth while for the meter maker to produce special patterns; but in the case of small or medium sized works, whose orders are of less magnitude, it would mean extra cost.

Taking it for granted, then, that a standard union is required, the question arises: "What standard shall be adopted?" In the case of Edinburgh, the standard adopted was one coinciding with the majority of the unions of the leading makers as at present in use. No doubt this was a good system to work upon from the point of view of the leading makers; but from the point of view of the gas engineer, would it not be better to adapt each size of union to the same size of standard wrought-iron tube? In this event, meters could be connected either with compo. or iron; iron being a great advantage where rats and mice are in evidence.

And now as to the tribunal which shall decide on a standard. If each association of gas engineers and managers, and each firm of meter manufacturers, were to elect one gentleman, surely the result would be a representative committee who, with an independent umpire, could settle this important question for all time. And with the industry advancing at such a rapid rate, and the orders for both ordinary and automatic meters daily increasing in magnitude, the sooner the settlement is arrived at the better.

Discussion.

Mr. A. E. Mottram (Hyde) said the members would find it rather difficult to criticize the paper, as they all agreed that the standardization of unions was most desirable. Everyone to whom he had spoken, and everything he had read on the subject, had been in favour of standardization, and he would be very glad if Mr. Berry would say what were the objections to it. He thought that if a paper had been given entitled, "A few reasons why meters should not be standardized," there would have been more room for discussion. Mr. Berry stated that, owing to the unions not being of one standard, it cost an ordinary company 50 per cent. more in gas-fitters' wages. He considered that this had been put rather too high; and if Mr. Berry's figures were correct, they would have had standard unions before to-day. In the smaller sizes especially, they had, in the majority of changes, one of the same maker's meters in stock. To bring the cost up to the President's figure, they must have a very small stock and very bad luck. So far as he could gather, the managers had not troubled much about the question. They had been simply indifferent on the matter. If a manager, when sending an order for meters, were to take the trouble to say they must be fitted with a certain union, he would get his meters all right; and if a few dozen managers would do this, the manufacturers would soon find it would pay them best to determine upon a standard. In ordering meters one day, he stated that the unions must be interchangeable. He gave the makers a sample union, and they sent the meters without the slightest objection; so that it appeared as if it was only a question of asking and receiving.

Mr. Tagg (Birkenhead) expected the author would have said something about the attempts which had already been made to reach standardization. Some years ago, the North British Association dealt with the matter, and the Board of Trade had intimated their intention of taking action. The question was, however, referred to the Gas Institute for consideration. He could not say what had been the outcome of it; but certainly there had been no practical result. This, he thought, showed that the question was not of such vital importance as the general opinion would indicate. Mr. Mottram had referred to the point as to extra cost through meter-unions not being interchangeable; and personally he considered that, with proper management, the extra 50 per cent. was out of the question. At Birkenhead, he was told, there were less than half-a-dozen cases per week where a fresh joint had to be made through unions not being interchangeable. One solution—not necessarily the best one—had been hinted at; and this lay in the fact that each engineer had it in his power to obtain for himself unions that were interchangeable. He was sure, judging from the excessive keenness of competition among meter makers, they would be only too ready to supply any union desired, and practically without increasing the cost. It would certainly be an advantage to all undertakings to have unions interchangeable; but personally he did not think it of vital importance. Otherwise the matter would not have remained *in statu quo* for so long a period, but some definite action would have been taken.

Mr. Butterworth (Miles Platting, Manchester), referring to the question of threads, observed that the one most in evidence at the present time was undoubtedly the London standard, which had 20 threads to the inch. Owing to the fineness of the thread, there was great liability to inaccuracy, unless the gauges were closely followed. It would, in his opinion, be better (if it could possibly be brought about) to have a standard such as the Whitworth, which was coarser, and in which there was less chance of deviation. As to the objections that might be brought forward in connection with the standardization of unions, the cost of changing the unions might be mentioned. Perhaps the most feasible plan would be for the alteration to be made as the meters were taken out for repairs. The makers receiving the meters for repairs would give the value of the old unions against the cost of the new ones; so that the expense would then be a minimum. The difference between the case of Hyde and Birkenhead might arise from the latter having fewer makes of meters in use. If all meter-unions were to be manufactured to a certain standard, the benefit to gas managers would be enormous; and the saving in fitters' wages would, in time, amply recoup them for any expenditure involved in making the change. He certainly thought it possible to adopt a standard; and, in his opinion, the Whitworth thread would be preferable to the London. Another point which was worth discussing had reference to dry meter-unions. Some people had their's ground; but he thought they might well consider whether the ground union should not be given up in favour of the washer union. There was no doubt that ground unions could not always be true. If a tail-piece was ground for a certain socket, it would not fit another socket; whereas a leather washer could be used on all unions.

The Chairman said he was certainly of opinion that there should be some standard for meter-unions. At Salford, they had various makes of meters. They manufactured meters of from 3 up to 30 lights, and had a standard for them—he believed it was the Whitworth thread. They could not, however, make all the meters they required—the demand being far greater than their means of production in that line; and this lack of standardization often put them in a dilemma. He certainly was of opinion that the makers would be willing to combine to bring about the desirable object of standardization. He believed they were all in favour of it.

Mr. Dudley (Oldham) said he knew of scores of instances where time had been thrown away owing to the unions required being of a different kind from those which were taken to the spot. He did not agree with Mr. Butterworth about leather washers. The tail of the union should be tapered; and if the thread of the union was interchangeable, it was quite possible for the tail to be made interchangeable as well. When they had leather unions, there was necessarily more labour for the fitters in carrying and using tools for fitting on the leathers.

Mr. Butterworth pointed out that in a ground union, there was every possibility of a leak being caused through the grinding of the tail not being suitable for the boss. It was almost impossible to get every taper the same; and there was little chance of interchangeability with a ground union.

Mr. Baxendale (Chorley) thought the standardization of unions might necessitate a standard size in meters also, according to capacity.

The Chairman did not think meters varied in size to any great extent; and any difficulty on this score could easily be obviated by means of packing.

Mr. Berry, in replying on the discussion, said the only possible objection to standardization was the cost. As to the 50 per cent. loss in fitters' wages, &c., through the lack of uniformity, if Mr. Mottram would only change places with him for six months, he would alter his opinion on this point. Mr. Mottram spoke of managers ordering unions and getting what they asked for; but would not this entail extra cost, particularly if they were small?

Mr. Butterworth: The makers are prepared to put in any union ordered, without extra expense.

Mr. Berry (continuing) said Mr. Tagg seemed to think the matter was not of vital importance, because action had not been taken before. The reason for the absence of definite action was probably that managers did not come in contact with the difficulty as much as their servants did, and consequently did not consider it to be so important as it really was. Although the subject was referred to the Gas Institute about two years ago, this was the last he had heard of it. With regard to their own case at Hyde, they had probably over a dozen makes of meters; and when they considered that perhaps three out of the lot would interchange unions, they would see that 50 per cent. loss was not too high a rate. He would like to have Mr. Butterworth's opinion about reducing the number of unions from twelve to four. He quite agreed with him about ground unions and leather washers.

Mr. Butterworth said the advisability of reducing the number of unions was for the gas companies, and not for the meter makers, to decide; and the question of cost came in. If in the grouping suggested, a larger diameter pipe were used on a small meter, where a small diameter of pipe had previously been used, this would mean greater cost.

Mr. Berry said in no case would it make any very great difference. There was, also, always an advantage in having a pipe large enough. He did not see that the standardization of unions meant also a standardization of meters.

Mr. Butterworth remarked that the meter makers were most anxious that a standard for unions should be adopted; and he believed that only the previous day they had the subject under discussion. He did not know whether the matter would be put aside; but he hoped something would be done.

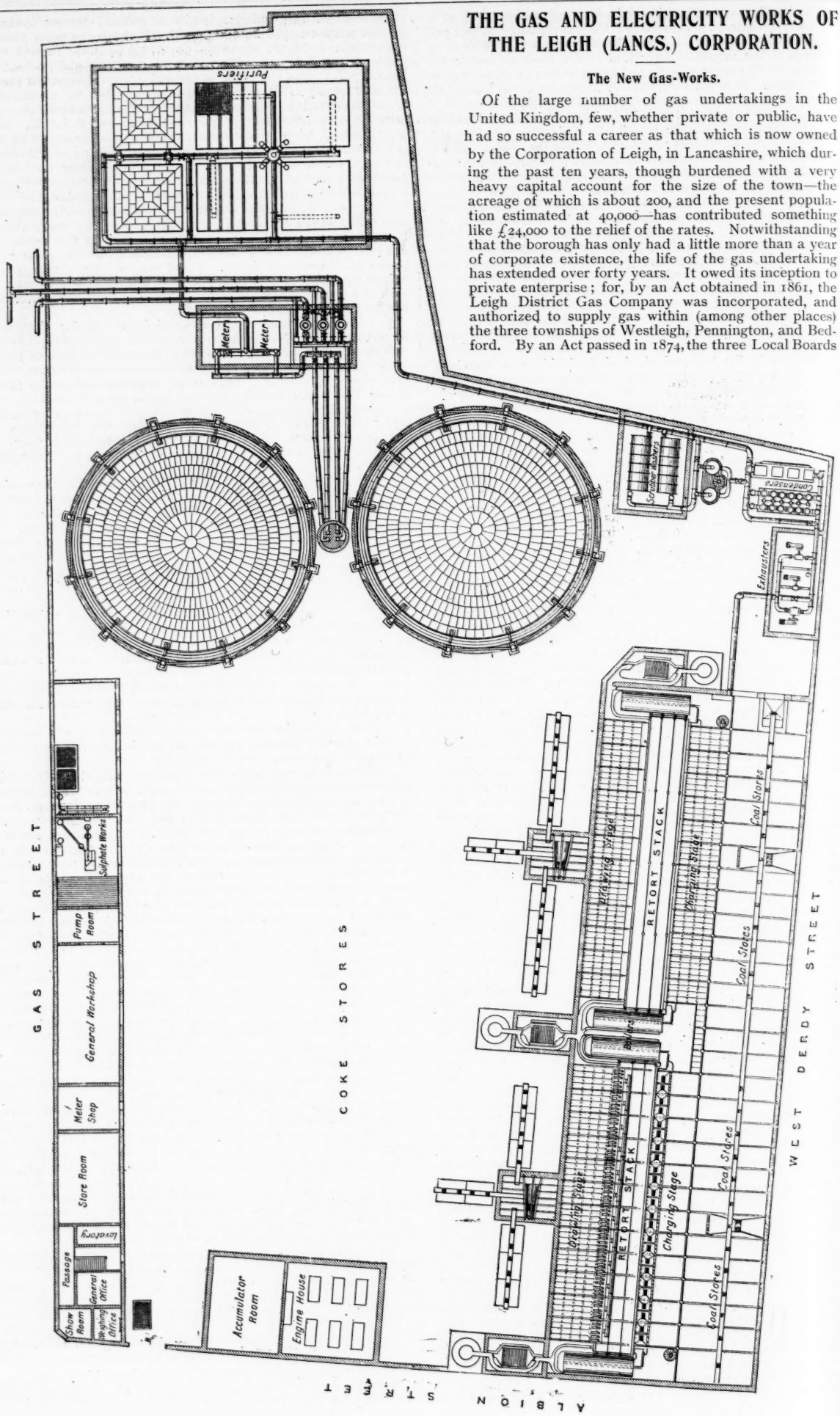
The Chairman referred to the question of discrepancies in fittings, and the manner in which meters were used for a greater number of lights than they were intended for.

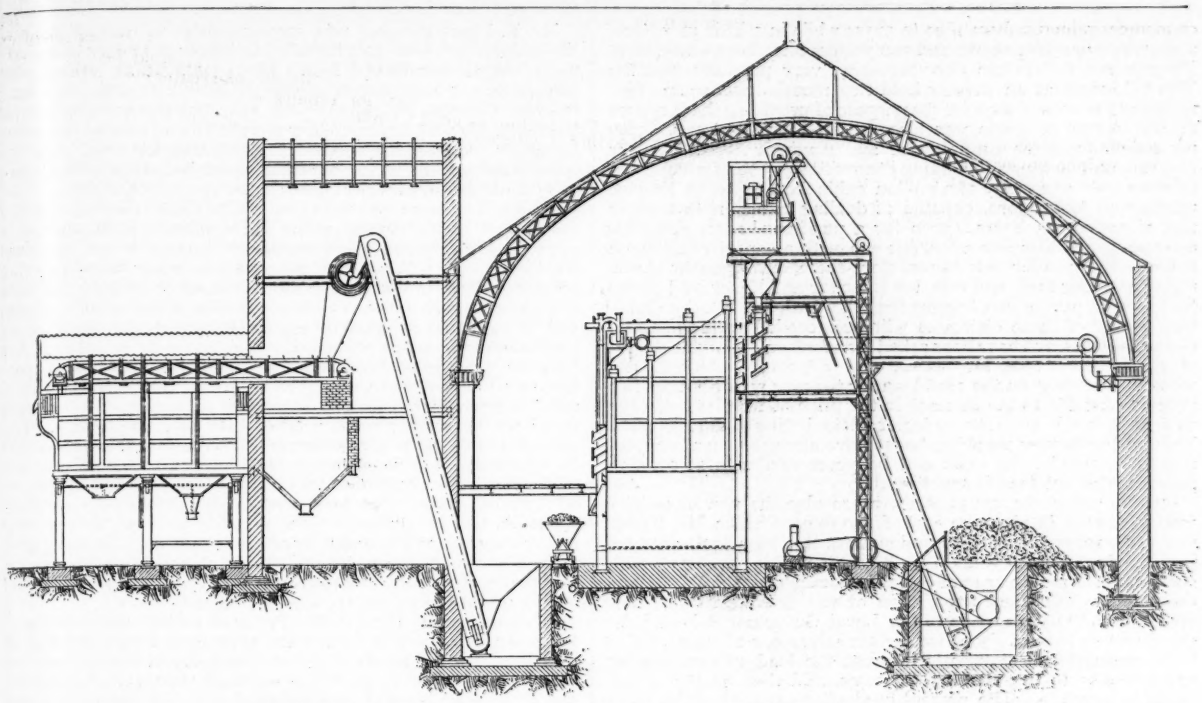
On the motion of Mr. Haynes, seconded by Mr. West, a vote of thanks was passed to the President for his interesting paper; and the proceedings then closed.

THE GAS AND ELECTRICITY WORKS OF THE LEIGH (LANCS.) CORPORATION.

The New Gas-Works.

Of the large number of gas undertakings in the United Kingdom, few, whether private or public, have had so successful a career as that which is now owned by the Corporation of Leigh, in Lancashire, which during the past ten years, though burdened with a very heavy capital account for the size of the town—the acreage of which is about 200, and the present population estimated at 40,000—has contributed something like £24,000 to the relief of the rates. Notwithstanding that the borough has only had a little more than a year of corporate existence, the life of the gas undertaking has extended over forty years. It owed its inception to private enterprise; for, by an Act obtained in 1861, the Leigh District Gas Company was incorporated, and authorized to supply gas within (among other places) the three townships of Westleigh, Pennington, and Bedford. By an Act passed in 1874, the three Local Boards





SECTION OF THE NEW RETORT-HOUSE AT THE LEIGH GAS-WORKS.

governing these townships were amalgamated, and authorized to buy out the Company, which they did for the sum of £48,000. Speedily finding, however, that they had got the worst of the bargain, they had to begin almost immediately to lay down new plant. The amalgamated Boards were not only empowered to supply gas in their own districts, but also within a portion of the township of Atherton (since added to Leigh), and the whole of the townships of Golborne, Lowton, and Kenyon. Thereby hangs an interesting little tale; for, though possessing these powers for upwards of a quarter-of-a-century, Leigh had never until quite recently laid mains so far as the outlying township of Golborne; which has now become an urban district. The result was that private individuals formed a Gas Company in that town, and have continued to supply until the present day, but without statutory powers to do so. The sequel was seen when a few months ago, as recorded in the "JOURNAL" at the time, the Company decided to promote a Bill to authorize them to supply gas in Golborne, and seeking to amend or repeal so much of the Local Boards' Act of 1874 as relates to the town. Thereupon Leigh at once commenced to lay mains; and they followed up their action by offering such advantageous terms to the Golborne District Council, that that body decided to oppose the Company's application within their own township. Consequently, a "very pretty quarrel" was started, which will shortly be continued in the Committee-rooms at Westminster.

The three Local Boards previously named became by successive Local Government metamorphoses, first the Leigh Local Board and then the Leigh District Council, and now their powers are vested in, and exercised by, the Leigh Corporation. The expenditure on capital account from the date of purchase up to 1880 was £68,948; from 1880 to 1890, £12,924; and from 1890 to 1898, £20,831—making a total of £102,703 up to the date of the town's incorporation. To-day the capital actually invested in the works stands at £130,833, or, according to the last annual report of the Gas Manager (Mr. John Foster), £10 4s. 5·11d. per ton of coal, &c., carbonized, 19s. 9·84d. per 1000 cubic feet of gas made, and £1 0s. 10·25d. per 1000 cubic feet sold. Glancing at the accounts, it is seen that in 1880, with the price of gas at 4s. 6d. per 1000 cubic feet (less 6d., 9d., 1s., and 1s. 3d. discounts), 30,802,300 cubic feet were sold, and a net profit was made, including the cost of street lighting, of £3850. In 1890, the consumption had almost doubled; being then 59,589,300 cubic feet; but the price had been reduced to 3s. 3d. per 1000 feet, less 3d. and 6d. discounts (with 4s. net for the small township of Lowton), and consequently the net profit was reduced to £2088. The consumption continued to steadily increase; and in 1891 the net profit was £859; in 1892, £1527; and in 1893, £2063. In 1894, though there was a gross profit of £3309, or 3·63 per cent. on the capital employed, there was a net loss of £510—the only one, so far as can be gathered from the accounts to which the writer has had access. In the following year, the large net profit of £2563 was made; and in 1896, £2098 was earned. The net profit for 1897 was £1278; and with a jump of more than 8 millions in the consumption for 1898, it went up to £3965—the price charged being still 3s. 3d. to consumers in Leigh, but brought down to 3s. 9d. for those at Lowton. This large profit induced the Council to lower the price to 3s.; and, as a consequence, the next year the profits were not so high, though £7208 or 6·86 per cent. on the capital employed was made. Then, however, began that upward movement in the price of coal which did not stop until as much as 5s. per ton had been put on. To meet the increased expenditure, many corporations and gas companies, as everybody knows, raised their charges; but this has not been done at Leigh. Last year the advance was not fully felt in the district, which is a colliery one; but Mr. Foster nevertheless reported that the average cost of coal and cannel carbonized, including carting, was 11s. 0·20d. per ton, or 1s. 3·02d. per ton more than the preceding year. Despite this fact, a gross profit of £9586, or 7·32 per cent. on the capital employed, was made. The quantity of coal and cannel carbonized was 12,800 tons; being 1785 tons more than during the preceding twelve months. The total bulk of gas sent out was 132,016,000 cubic feet, of which 127,072,900 cubic feet was accounted for—an increase of 17,385,200 cubic feet on the year 1898-9. That this remarkable progress is being well maintained is shown by a recent six-monthly return, which stated that the quantity of gas disposed of was 37,839,278 cubic feet, against 33,632,980 cubic feet in the corresponding half of the previous year—an increase of 4,206,298 cubic feet. As the extra make was only 2,239,000 cubic feet, there was thus a decrease in waste and leakage of 1,967,298 cubic feet—a very considerable item when the fact is borne in mind that, owing to the character of the district, the mains are subject to much damage from subsidence. The early part of the past winter was, however, so mild and open, that the consumption of gas was nothing like what it was in the preceding year; and with coal at three times the price at which it stood when Mr. Foster took up his position at Leigh, on July 13, 1897, the difficulty of making ends meet has been a very real one, especially as the introduction of electricity for lighting, power, and business purposes is taking away some of the best customers among the Leigh tradespeople. Notwithstanding this, however, working in the financial year just closed will show a profit; several improvements having been made at the gas-works, and a large number of gas stoves and grillers having been hired out.

The present works are capable of manufacturing somewhere about 1½ million cubic feet of gas per day. The ground plan shows the arrangement when all the proposed extensions have been carried out. The retort-house (shown in section) contains seven beds of inclined retorts 20 feet long, and four beds of horizontal retorts 18 feet long. It has a capacity of 1 million cubic feet per day; and when a further five beds of inclined retorts have been substituted for the present horizontal ones, its daily capacity will be raised to close upon 1¼ million cubic feet. The adoption of inclined retorts proved so successful, that in eight months £315 was saved in working expenses; the greater ease with which the retorts were stoked causing a reduction in the number of men employed. The other plant includes purifying-houses, with four 18 feet square purifiers; a set of annular condensers capable of dealing with 500,000 cubic feet of gas daily; two exhausters, with capacities of 40,000 and 30,000 cubic feet per hour respectively; two tower scrubbers, 45 feet by 5 feet; a Livesey washer; holders having a capacity of 600,000 cubic feet; meter and governor house; and engine and accumulator rooms. It is noteworthy that these are the only works in the United Kingdom the motive power for which is electricity; all the coal and coke elevating, conveying, and breaking plant being worked thereby, while in the purifying-house there is an overhead electrical crane.

The increase in the consumption of gas previously spoken of was at the rate of 123 per cent. from 1888 to 1900—the number of

consumers going up from 1820 to 5151; while in a little more than a year, 1560 cooking-stoves and 700 grillers have been introduced. Prepayment meters are also becoming very popular; and the Town Council, at an inquiry held two months ago, sought permission to borrow £6000 for the purpose of providing these meters alone. A sum of £6000 was also required for gas-stoves, £3000 for mains, £1300 for a new meter and governor house, £500 for two 12-inch governors (including connections), £700 for new condensers with a capacity of a million cubic feet, £6500 for six new purifiers 30 feet square, capable of dealing with 2½ million cubic feet of gas per 24 hours, £5000 for a purifying-house, £7000 for converting a holder into a four-lift one, with a capacity of 800,000 cubic feet, £2700 for new offices, store-room, &c., £300 for covering a gasholder tank, and utilizing it for tar and liquor, and £1000 for draining, paving, and flagging the coke-yard, &c. It is probable that several of these estimates will be exceeded; and the Local Government Board have been asked for a further £3000 on account of gas-stoves, £1500 for mains, and £805 to make good an amount overspent on the 1898 loan for the new retort-house; this excess being due to the increase in the price of iron between the time of the application for the loan and the letting of the contracts. Tenders for the new purifying-house have already been advertised for, and much of the work will be proceeded with as soon as possible after the loan is sanctioned.

On the gas-works premises there are also the new electricity works (erected in 1899 at a cost of £10,500), of which Mr. Foster is also Manager. The Corporation have not been long engaged in supplying electricity, and they have already 73 consumers with 2008 lamps (equal to 4042 of 8-candle power) connected. So successful has been the introduction of the new illuminant, that application has been made to the Local Government Board for sanction to a loan of £5000 for further extensions of mains, which it is expected will materially increase the load without adding substantially to the working expenses, and thus enable a fair profit to be made. The present generating capacity of the plant is 200 kilowatts; and as in November last the load was only 70·15 kilowatts, there is ample margin for increased consumption. Motors are being hired out, and meters are fixed free. The Wright demand indicator system of charging has been adopted, the price per unit for lighting being 7d. for the first hour, and 2½d. per unit afterwards; while 3d. per unit for the first hour, and 1½d. per unit afterwards, is charged for power. Mr. Foster, who designed the works, had had valuable previous experience at Nelson, where he designed the first electric lighting plant put down by a Lancashire Corporation for public and private lighting. At Leigh, he is also the Manager of the water undertaking, the extension of which is in contemplation by the Corporation. It will thus be seen that in every department over which he has control progress is the order of the day.

NEW ENGLAND ASSOCIATION OF GAS ENGINEERS.

(*Concluded from p.* 1000.)

Mr. F. H. Shelton, of Philadelphia, submitted a long paper under the title of "How They Do Things on the Other Side," the full text of which was given in the "JOURNAL" for the 12th ult. (p. 691). It consisted of some account of visits paid to gas-works in Europe in the course of a month spent there on the occasion of the International Gas Congress in Paris, last September. The author called at eleven large and four small gas-works, situated in seven different countries, and selected as being typical and representative. They included Beckton, Nairn, Inverness, Paris, Zurich, Dresden, Berlin, Copenhagen, Altona, Cassel, Rotterdam, The Hague, Amsterdam, Ostend, and Salisbury. Having given a lively conversational account of his observations at these places, Mr. Shelton devoted a paragraph to the question of inclined retorts as adopted in Europe, arriving at the conclusion that there was no doubt as to their satisfactory working, or as to their being the coming thing for large works. In a general way, he saw no difference between the best American and the best foreign practice, and referring to cheaper gas in England, thought that protection from competition, and longer years at it, were the chief factors; the operating costs being less only so far as the benefit of larger quantity made is concerned. Comparing the position of English gas managers with American, he thought the latter were distinctly better paid, and had more freedom. The general average of cleanliness, fresh paint, and condition seemed to be better in England than at home.

The President called upon Mr. Ramsdell and Mr. M'Donald, who accompanied the author throughout his trip, to add a few words. Mr. Ramsdell said that although he came back from Europe as enthusiastic about inclined retorts as the author, he had subsequently been figuring as to the cost of installation, and must say he had somewhat modified his opinions. There was no doubt as to the efficiency of the inclined system; and it was purely a question of cost and local conditions. The descriptions given of the various works visited were able and complete; and he thoroughly endorsed them. Mr. M'Donald was also greatly impressed with inclined retorts. Since his visit to Europe, he had seen some in operation at Louisville. They worked beautifully; and for large undertakings it was well worth while to look up the matter.

Mr. F. Egner followed with some remarks on inclined retorts, the success of which was, he said, no longer a matter of experiment, but an established fact. They could be as substantially erected as, and at comparatively no greater outlay than, horizontal retorts; the cost for repairs was less, and the working results quite as good; while the greater simplicity and ease of operating admitted a material economy in manufacturing costs. Unless other good reasons to the contrary could be advanced, no company could afford to neglect these important considerations. The engineer of a large gas-works in Switzerland claimed, as the advantages of the system, entire independence from caprice or goodwill of workmen, as, if necessary, a large works could be conducted with a handful of inexperienced men; simplicity and greater security in operating; and increased production per man employed, though with less labour. He also added that gas-works with a minimum product of 100,000 cubic feet per diem could with advantage adopt mechanical coal and coke handling. Mr. Thomas Newbigging had alluded to inclined retorts as an important development that would grow in favour year by year. But it must be remembered that the successful application of the system could not be accomplished without care and intelligence. The author proceeded to give examples to show that it was possible for inexperience or negligence in working to be attended with the same disastrous effects that they all knew would follow in the case of ordinary firing. One man on each shift should be made responsible for the condition of the furnace and retorts. Scurfing inclined retorts was a simple operation; and they did not gather carbon so quickly as horizontals. He claimed that the system was the most valuable improvement in gas manufacture that had been brought out during the last ten years.

Discussion being invited, Mr. Prichard said he was satisfied as to the desirability of adopting the system, and was about to do so. He expected to effect a large economy in labour, and also found that less floor-space was required than with horizontals. Mr. F. C. Sherman was quite satisfied as to the saving of labour. He had visited the Louisville works, and found that one man handled 9 tons of coal, as against 2½ tons with horizontals at his own works at New Haven. Anyone could make his own figures from that. Four men took care of nine charges per hour—two at the charging and two at the discharge end. It was also possible to use a cheaper quality of coal, containing a larger proportion of small than could be worked off in horizontal retorts.

Mr. Egner, in replying, said that a 20-foot inclined retort covered something less than 17 feet of horizontal space. Then there was not so much room required in front of the retorts; so that for the same retort capacity one might count on saving 10 feet in width of the retort-house. He preferred single rows to double sets, back to back; and the single row was the same thing in effect as the old-fashioned "through" retort.

Dr. Schniewind, of the United Coke and Gas Company, next described the Otto-Hoffman ovens in use at the Everett works. In connection with this paper, attention may be drawn to the very full account of the plant which appeared in the "JOURNAL" last month (pp. 616, 679, 749, 820). The author said it was a coal-gas process; the chief differences being that the charging capacity per retort or oven was 5½ to 6½ tons, and that the ovens were heated by means of a portion of the gas instead of with coke. Handling the coal in larger quantities showed considerable saving of labour; and they had given a great deal of attention to the utilization of the bye-products. There were 1130 of these ovens in use in the United States and Canada, and some 900 were in course of construction; while in Germany there were 11,700. But most of them were intended for the production of foundry coke merely; and it was only of late that a few plants had been erected which also supplied illuminating gas. They had three plants in course of construction—viz., the New England Gas and Coke Company, 400 ovens; Hamilton (Ohio), 50 ovens; and Camden, near Philadelphia, 100 ovens. The ovens were large fire-brick chambers, 33 feet long, about 6 feet high, and 18 inches wide. They were charged by three doors in the top; and there were doors at each end, so that the entire mass of coke could be forced out by a pusher or ram. It was received on a movable platform, cooled, and simply tilted into a car or truck. There were fifty of these retorts in one block, with a common heating system; and the yield of gas was 9000 cubic feet per ton, of which 5000 cubic feet was used for heating the ovens, leaving a surplus of 4000 cubic feet for sale. A Siemens regenerator was used; and the fuel consumption was much smaller per ton of coal carbonized than was usual in an ordinary gas-works. The temperature at the outlet of the regenerators was only 250° C. The whole of the gas made was condensed and washed in a manner similar to that practised at gas-works; and the portion first given off was allowed to pass on for sale, the remainder being returned to the oven-bench. Sometimes a cyanide and a benzol extractor were added; but the latter could not be used if illuminating gas was required. It was, however, proposed to extract the benzol from the portion returned to the oven-bench; and this could be added to the gas for sale, if desired. At present they were running about 300 ovens, using some 1600 tons of coal a day. There was a ready sale for the coke, which was employed both for raising steam and for domestic purposes. The tar and sulphate were easily disposed of; and the gas was supplied to the Massachusetts Pipe-Line Company. A table was exhibited, showing the yield by the oven process from a few standard coals, which averaged about 74 per cent. coke, 4 per cent. tar, 1·1 per cent. sulphate, and 9000 cubic feet of gas per ton of 2000 lbs. Some

coals would yield as much as 85 per cent. coke, with very little less gas, but considerably less tar and ammonia; and others yielded over 10,000 cubic feet of gas, with less coke. But as they saved the best portion of the gas for sale, they could command a greater range of coal than the gas-works; and any ordinary coking coal would give from 18 to 20 candle gas. They could make high-quality gas out of slack coal; but the coke produced would only be fit for domestic use. The result of using large quantities of coal in layers 6 feet deep was a hard, dense coke, which was more economical in the blast-furnace than the ordinary beehive coke. They had breakers and screens for sorting the coke into various sizes, and claimed to produce a smokeless fuel. The advantage of this in the numerous places where anthracite could only be obtained at a prohibitive cost, was obvious. At present they sold 700 tons of coke daily to railroads, 350 tons to factories, and 350 tons for domestic use. By their system, the quantity of coal handled per 1000 cubic feet of gas produced was more than double that at the ordinary gas-works; and therefore there was more tar and ammonia in proportion. Apart from this, it was claimed that the yield of ammonia per ton of coal was about doubled. Whereas ordinary gas-works tar contained 25 per cent. of fine-carbon or lamp-black, the oven tar only contained 5 to 8 per cent. They manufactured both sulphate and strong liquor ammonia. The author went deeply into figures, to prove that there would be no difficulty in disposing of a largely increased production of tar and ammonia without spoiling the market for gas companies. The gas as sent out for sale had an illuminating value of 18½ candles, and a heating value of 707 units; while that retained for use had an illuminating power of 8 candles, and a heating value of 515 units. The saleable gas averaged 5 per cent. illuminants, 37 per cent. marsh gas, 44 per cent. hydrogen, 6 per cent. carbonic oxide, 3 per cent. carbonic acid, and 5 per cent. nitrogen, &c., and the fuel gas, 2½ per cent. illuminants, 29 per cent. marsh gas, 52 per cent. hydrogen, 5 per cent. carbonic oxide, 3 per cent. carbonic acid, and 8½ per cent. nitrogen. In the fuel gas the illuminants consisted entirely of benzol, and represented 40,000 candle-feet per ton of coal, which could be added to the saleable gas if required. It was possible to follow variations in the demand for gas at different seasons of the year, by the use of producers as auxiliaries; thus liberating a larger proportion of gas for sale.

Mr. Neal said that at Charlestown he had for six months been taking a supply of the Everett gas from the Pipe Line Company. The quality averaged over 18 candles; and with one exception the purity was right, while the supply pressure was always sufficient. He could therefore testify that the gas was good and satisfactory to the consumers. His sales of coke had not suffered at all by the introduction of the Everett coke in the district.

In the course of considering the contents of the question-box, Mr. Nettleton, speaking on the subject of prepayment meters, said that he thoroughly believed in the system. At Derby, he commenced in 1896, and had now 1300 in use, or nearly as many as of ordinary meters. By this means he had reached the working classes, to whom he had never expected to sell much gas. For years it had been his practice, when fixing a cooking-stove, to supply a bracket for lighting as well; and this led to further orders for lighting appliances. He had been going somewhat closely into costs, and found that the total for maintenance of meter, collecting, and office expenses, was about 6s. per meter per annum. He did not think the ordinary meter, including costs of collection, &c., could be worked for a less amount. He had only experienced six cases of robbery; and the loss from this source was not worth consideration. Mr. Pratt said that the prepayment system was not only finding favour among the poorer classes in his district, but with the larger consumers as well. Mr. C. A. Learned had a similar experience; but he declined to fix them except for the poorer classes. As to whether, in coal-gas manufacture, the highest yield should be sought for rather than the greatest number of candle-feet, Captain White said this depended upon whether the community supplied used Welsbach or flat-flame burners. There was more money in selling a low-power gas to people who used Welsbach burners, than high-power gas to users of flat flames. Gas was gradually resolving itself into a question of heat units, rather than of illuminating power; and it was simply waste of money to give a 20 to 25 candle gas to users of incandescent burners. Mr. Norris said that, assuming a mixed gas of 20-candle power was supplied, a variation in the quality of the coal gas meant more or less oil in the water-gas apparatus, other costs not being affected. Taking average prices—say, oil at 2d. per gallon, coal at 14s. 6d. per ton on the works, and receipts for residuals 10s. 6d. per ton—he calculated there was a difference of 1d. per 1000 cubic feet in favour of the higher yield per pound. Where the deficiency in illuminating power was made up by using more oil in the water-gas set, the most economical result was obtained with a high yield per pound. A difference of $\frac{1}{10}$ cubic foot of gas yielded per pound would mean ¼d. per 1000 feet of gas. Mr. Egner remarked that possibly the previous speaker had not considered choked pipes and other things that added to the expenses when a high yield was the object aimed at. Mr. Coggeshall said he had a try for high yields; but taking the matter all round, he found it was better to be satisfied with 5 cubic feet per pound. On the question of whether the Welsbach burner was in sufficiently general use to warrant going back to 17-candle gas, Captain White said he had frequently expressed the opinion that it was a mistake to train the public to the use of high-power gas, and that it would be possible to make coal gas by some cupola process, perhaps not exceeding 16-candle power, but possessing the heating value of a straight coal gas. He believed the development of the gas industry would not follow the lines of water gas or other new processes, but that the object would be to get the greatest heat value out of a ton of coal; and he thought most of those present would live to see gas sold, not by cubic feet, but by heating values. He also looked for the introduction of a cheaper and simpler incandescent burner than the one now in vogue. Gas would then be sold at one price for all purposes, and at a figure low enough to compete with coal. The President did not think they had reached a point where they could go for lower candle power, and remarked that high-candle power gas was also a gas of higher heat units. He thought 18 or 19 candle straight coal gas and 25-candle water gas, if the carbonic acid was not removed, was about the right thing. Reverting for a moment to the previous question, the maximum yield that would avoid practical difficulties was the yield they ought to get. Mr. Sherman said that not one-third of his customers used incandescent burners; and therefore the majority would object if he reduced the candle power. He also referred to some recent experience in the use of oxide of iron. He tried all sorts of oxide, but could not get a duty of much over 1000 cubic feet of gas purified per bushel, and was changing almost daily, when a neighbouring gas manager suggested raising the temperature of the purifying room to about 70°. This simple expedient proved of immense value; and instead of changing boxes daily, he only changed three a month in December. So he wished to direct attention to the importance of temperature in connection with the use of oxide in gas purification.

The meeting closed with the usual votes of thanks.

AN ANALYSIS OF LEEDS GAS LIQUOR.

By Arthur W. Cooke, F.C.S.

[A Paper read before the Yorkshire Section of the Society of Chemical Industry.]

Gas liquor, as a rule, contains from 1·5 to 2·5 per cent. total ammonia; the average being about 2 per cent. It does not generally contain an appreciable quantity of uncombined ammonia, nearly all of it being combined, chiefly in the form of carbonate sulphide, and chloride.

A complete analysis of a gas liquor is not very often performed, as several of the bodies there present are not of technical importance. The chief point of interest to the chemical manufacturer is the total quantity of ammonia which the liquor contains. Next in importance comes the percentage of "fixed" ammonia, by which is meant the proportion of the ammonia in the form of salts which are not volatile at the temperature of boiling water. Another important point in the analysis is the percentage of "free" or "volatile" ammonia. By "free" or "volatile" ammonia is meant those salts of ammonia which are volatile at 100° C. These consist almost wholly of carbonate and sulphide. The term "free" is used in the technical sense, and is not to be confounded with chemically "free" or uncombined ammonia. It is often found necessary to estimate the carbon dioxide and sulphuretted hydrogen, and occasionally the sulphocyanide and ferrocyanide. The other bodies are very seldom estimated.

I thought it might, perhaps, be of interest to have the figures of the analysis of a sample of the Leeds gas liquor. The sample analyzed represents the whole of the make of the three Leeds Gas-Works for the month of January, 1901, and is an average of about 6000 tons of liquor. The analysis was performed in the laboratory of my firm, Messrs. Brotherton and Co. The results are stated in grammes per 100 cubic centimetres of the liquor—

		= to NH_3
Ammonium carbonate—$(NH_4)_2CO_3$	3·397	1·203
,, sulphide—$(NH_4)_2S$	0·372	0·185
,, chloride—NH_4Cl	1·261	0·401
,, sulphocyanide—NH_4CNS	0·093	0·020
,, sulphate—$(NH_4)_2SO_4$	0·063	0·016
,, thiosulphate—$(NH_4)_2S_2O_3$	0·384	0·288
,, ferrocyanide—$(NH_4)_4FeC_6N_6$	Trace	..
,, cyanide—NH_4CN	None	..
Ammonia derived from other sources (by difference)	..	0·031
Total ammonia	..	1·945

"Free" ammonia, 1·418; "fixed" ammonia, 0·527; total sulphur, 0·422; "ounce strength," 8·96. The total sulphur was distributed as follows:—

	Per Cent.
As sulphide	41·47
,, sulphate	3·55
,, thiosulphate	39·34
,, sulphocyanide	9·24
In other forms (by difference)	6·40
	100·00

Besides the compounds of ammonia which the analysis shows, there are present in every gas liquor bodies derived from coal tar, chiefly those of the benzene and pyridine series. These, so far as I know, have never been estimated, so that a really complete analysis of a gas liquor has yet to be made. Such an undertaking would be a very difficult one.

I have nothing much to add in the way of new methods for the

estimation of the different constituents. Perhaps it will be as well, however, to mention one point in connection with the estimation of the carbon dioxide present as ammonium carbonate. The general method for estimating this body is to add a known quantity of the gas liquor to an ammoniacal solution of calcium chloride, when calcium carbonate is precipitated thus—

$$(NH_4)_2CO_3 + CaCl_2 = CaCO_3 + 2NH_4Cl.$$

This precipitate is then washed and titrated by means of standard hydrochloric acid. If this experiment is performed in the cold, a flocculent precipitate is produced, which is somewhat difficult to filter. On warming, the precipitate becomes granular; but the point is that it should not be boiled, or even heated for any length of time, otherwise a reverse reaction will set in, carbonate of ammonia being re-formed to some extent, thus—

$$2NH_4Cl + CaCO_3 = CaCl_2 + (NH_4)_2CO_3.$$

As this body is volatile, some of it is likely to be lost.

The general method for the estimation of the sulphuretted hydrogen is to precipitate as zinc sulphide, and treat the precipitate with bromine and hydrochloric acid, after which the sulphur trioxide formed is precipitated by means of barium chloride, and the barium sulphate produced is weighed, and the sulphuretted hydrogen calculated from the amount thus obtained; or the zinc sulphide is dissolved in hydrochloric acid containing excess of standard iodine, the undecomposed iodine being titrated by means of standard sodium thiosulphate. A quicker method, however, which gives results accurate to the second decimal place, and of quite sufficient accuracy for technical purposes, is, I find, to proceed as follows: Take 25 c.c. of the sample, dilute to about 150 c.c. with water, and distil in an apparatus similar to those used in the estimation of ammonia, into about 700 c.c. of water containing sufficient caustic soda to combine with all the carbon dioxide and sulphuretted hydrogen that may be contained in the liquor.

This solution is cooled, slightly acidified with acetic acid, and titrated with decinormal iodine. By this method results may be obtained in a little over half an hour. The other methods take a much longer time. The residue left in the distilling-flask, which amounts to from 10 to 15 c.c. in volume, may then be used for the estimation of fixed ammonia, or for an approximation of the thiosulphate present in the liquor, by acidifying and titrating with decinormal iodine.

There is a method frequently used in estimating the sulphuretted hydrogen in what is known as "concentrated gas liquor;" but this does not give good results when applied to ordinary gas liquor. This "concentrated gas liquor" contains about 16 per cent. of ammonia, 12 per cent. of carbon dioxide, and 3 per cent. sulphuretted hydrogen, but no fixed ammonia, and is used in the manufacture of carbonate of soda. The method consists in titrating some of the diluted liquor in a porcelain basin, by means of a standard ammoniacal solution of copper sulphate, during constant stirring. A flocculent precipitate of copper sulphide is produced, which, as soon as the last trace of sulphuretted hydrogen has combined with the copper, becomes granular and falls to the bottom of the basin. With a little practice a sharp reading may be obtained. In the case of gas liquor, however, the end reaction is not sharp by any means; so that the results are doubtful in value.

Although an appreciable quantity of hydrocyanic acid exists in crude coal gas, it is seldom found in gas liquor. The reason for this lies evidently in the fact of the presence of an excess of carbon dioxide, which drives the hydrocyanic acid out of its combination with ammonia.

In entering into large contracts for the purchase of liquor, it is usual to tender on the sliding-scale, on the basis of the price of sulphate of ammonia—the price rising or falling in proportion to the rise or fall of sulphate. It is usual also in tendering to quote, not in percentage of ammonia, but in "ounce strength." The term "ounce strength" is a survival of the times when a direct titration was made by means of sulphuric acid, and expresses the number of ounces of strong sulphuric acid necessary to saturate one gallon of the liquor. It is not usual now to make a test in that manner. When the figures for ounce strength are required, the number of grammes of ammonia per 100 c.c. of liquor, obtained by distillation, is multiplied by the factor 4·61, which gives the desired figures.

With the exception of that produced in the large towns, the liquor is sold on tests performed by the Twaddel hydrometer—every degree Twaddel being assumed to be equal to the strength of 2 oz.

I may say, in conclusion, that the high figure which has now to be paid for the raw material, combined with the high price of fuel, of which, of necessity, a large amount is used in distilling on the large scale (as the liquor contains 50 parts of water to 1 part of ammonia), and the crippling of the outlets for the manufactured products on account of the war, render it necessary for the manufacturer to be on the look-out for any improvements which may effect a saving in the working of the processes.

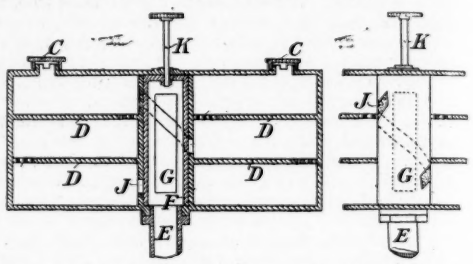
The death is announced of Lady Siemens, widow of Sir William Siemens, F.R.S. It took place at Sherwood, Tunbridge Wells, on the 12th inst. The deceased lady was the youngest daughter of the late Mr. J. Gordon, of Edinburgh, and was married to Sir William Siemens in 1859.

REGISTER OF PATENTS.

Carburetting Air or Gas.—Purves, W. P., and the Notkin Syndicate, Limited, of Edinburgh. No. 6857; April 11, 1900.

This is a modification of Patent No. 20,667 of 1895; the improvement mainly consisting of special adaptations for its employment for motive power purposes, where it is "desirable to be able to regulate to a nicety the quality of the gas . . . so as to have either a greater or a less degree of carburation."

As shown, the spaces between the shelves D are filled with an absorbent. The air-admission regulators are at C. The central pipe which passes up through the carburettor has cut in it a helical slot or passage J. F is a cylinder closed at its upper end, in which is a longitudinal slot or passage G. The lower part of the cylinder fits into the draw-off pipe E. Affixed to the cover of the cylinder is a rod K, terminating in a wheel or other device to be actuated by hand, so that the intersection of the helical passage J and the longitudinal passage G will form a port travelling up and down when the handle is revolved.



The operation of carburetting air "in nicely varied proportions," or of drawing off gas of the exact density required, is as follows: Ordinary atmospheric air enters at C, and as it comes in contact with the absorbent previously impregnated with the hydrocarbon employed, it becomes heavier and falls downwards, taking up as it descends more and more of the hydrocarbon vapour. In order to give the air a longer travel through the absorbent, shelves D are placed across the receptacle in which are perforated portions. If, now, the handle is so turned that the port between the helical slot and the longitudinal slot is near the top of the box (or above the top shelf), it is clear that the air has only to pass from the air-admission regulator through a comparatively small portion of the absorbent; and if the gas is drawn off at this point, a gas poor in hydrocarbon is the result. If, however, the handle is so turned that the port now travels downwards, the air will have to pass through more and more of the absorbent, with the result that carburetted air of an increasing degree of carburation is drawn off, until the port reaches the lowest point of its travel.

The sketch (with the above description) illustrates only one form of this type of regulator—many modifications could be adopted without departing from the spirit of the invention. Thus, instead of the cylinder F being actuated, it could be made a fixture, while the pipe with the helical slot could be made to revolve. Or, as another modification, the helical slot could be in the cylinder, while the longitudinal slot is formed in the pipe. Instead, too, of either being actuated from above, they could be operated from below. It is also clear, says the patentees, that such regulators could be used for carburettors for lighting and heating, as well as for motive power purposes; and that the apparatus could be used for enriching coal and other gases as well as air.

Incandescent Gas Lighting Apparatus.—Brookes, A. G.; a communication from the Incandescent Gas-Light Company of Boston, U.S.A. No. 23,850; Dec. 31, 1900.

By the use of this incandescent gas lighting apparatus, it is claimed that "a light of great intensity and power is produced by the combustion of a mixture containing a very small percentage of gas—means being provided to properly distribute the ignited gas to the mantle to effect a thoroughly brilliant and complete incandescence thereof." This is effected by fixing between the burner-outlet and the inlets for air and gas, a mixer "of peculiar and novel construction." Air under a pressure—preferably slightly greater than the pressure of the gas—is employed.

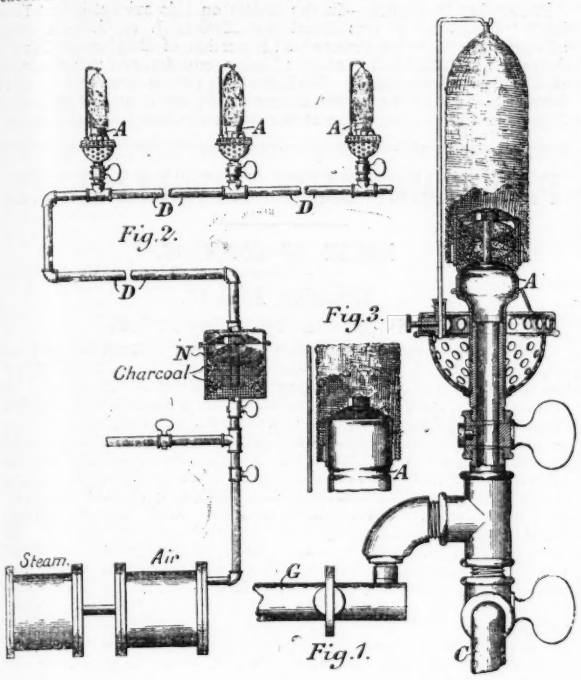
Fig. 1 (next page) is a view of the arrangement applied to a single burner. Fig. 2 illustrates the manner in which a common mixer may be utilized by a number of burners. Fig. 3 is an enlarged view of one form of burner, with the usual end-cap omitted.

A tubular chamber A, at the upper end of the gas and air supply tube, has at its upper part a chamber constituting the mixer. The burner is a "foraminous screen" of fine wire gauze, secured to one end of a sleeve-like cap slipped over the upper end of the chamber. The shade-holder is arranged with a socket to receive the supporting standard for the mantle. The plug-valve below is mounted on a T-coupling communicating by conduits G and C with sources of gas and air respectively. The air (under pressure slightly greater than the gas) is conveyed from any suitable pump or compressing device.

To thoroughly mix the air and gas before reaching the burner, the mixing-chamber has in it a series of arched foraminous diaphragms, preferably made of wire netting of different degrees of fineness—the coarsest-meshed diaphragm being the lowest; and it is placed with its convex face uppermost. Two oppositely arched diaphragms, placed with their edges together, form a hollow convexo-convex partition supported on the coarse diaphragm already referred to; and a fourth diaphragm, near the top of the chamber, rests with its convex face against the upper diaphragm. Crystalline material not affected by the action of gas—such as quartz crystals—may be placed within the partitions; and between the partitions and the wall of the chamber, the space may be filled with granular matter, preferably charcoal. Whether this packing be used or not, "a permeable barrier is provided in the chamber through which the entering gas and air must pass in

various and multitudinous channels, so that they are thoroughly and intimately mixed before reaching the burner; the retardation of the flow of the gaseous mixture being sufficient to provide for effective and uniform mixing."

When the apparatus is to be operated the valve on the gas-pipe is opened; and when the gas issues at the burner, it is lighted, after which the valve on the pipe C is opened to admit air under pressure. The two valves are then adjusted "until the flame burns clearly and almost invisibly in daylight." With the air under pressure, and the thorough mixing, 10 per cent. of gas is said to be "amply sufficient for the mixture, and a most thorough and intense incandescence of the mantle is effected."



In fig. 2, a series of burners are shown in communication with a common mixer—the burners being connected by unions with the service-pipe or conduit D, and each burner having its own service-valve. The mixer N comprises a tubular chamber having foraminous diaphragms arranged in it, and constructed as described, with a bolt and nut for "varying the permeability of the barrier." The service-pipe D is connected with the outlet of the chamber, and a screen may be used, if desired, between the end of the pipe and the first adjacent diaphragm. A T is coupled to the valve-case at the inlet end of the mixer, such case having a main shut-off valve between the mixer and the coupling; the latter being connected with the gas supply by a pipe having a controlling valve, and also by a pipe with the source of air under pressure—as, for instance, a pump comprising an air-compressing chamber or cylinder and a suitable steam-cylinder. The gas-valve is first turned on; and after the gas at the burners has been lighted, air is admitted, and when the proper proportion of air and gas is attained by manipulation of the valves, further passage of the mixture to the burners is controlled entirely by the main service-valve.

When the invention is practised in this manner, it is preferable to provide each burner with a spreader, shown in enlarged detail in fig. 3; the cap having mounted upon its gauze end a polygonal spreader or nut screwed on by a bolt, the threaded end of which is passed through the gauze. The flat faces of the spreader direct the flame upon the adjacent portion of the mantle; but the spreader is protected by an external gauze cover, as shown in fig. 1, when the burner is in use.

Purifying Anthracene and Recovering the Purifying Agent.—Wirth, E., of Dortmund, Germany. No. 14,462; Aug. 13, 1900.

The separation from the anthracene of the carbazole found in considerable quantities in many crude anthracenes cannot be effected, says the patentee, by re-crystallization from coal-tar oil, for instance, because of the slight solubility of the carbazole. The processes for separating carbazole from crude anthracene by washing the latter with solvents of carbazole—such as pyridine, acetone, or liquid ammonia—have the disadvantage that anthracene is dissolved together with the carbazole; and the two cannot afterwards be separated. The process which depends on the conversion of the carbazole into its potassium compound by the action of caustic potash is not easy, because of the high temperature required.

The present invention, therefore, relates to a process for separating carbazole from anthracene by converting the former into its easily soluble nitroso-compound, while the sparingly soluble anthracene is not attacked by the re-agents used. The process has the advantage that the nitrous acid employed for forming the nitroso-compound can be recovered from the solution obtained; and at the same time technically valuable carbazole derivatives may be isolated. Thus this process for separating carbazole from crude anthracene is "very cheap;" and by it the hitherto nearly unused carbazole is "presented for application."

There is used in this invention a new method for producing nitroso-carbazole. Hitherto this compound has been obtained by treating carbazole in acetic acid or ether solution, under certain conditions, with nitrous acid. It has now been found that nitroso-carbazole is easily and smoothly formed if the action of the nitrous acid proceeds in the presence of an indifferent—that is, oxygen-free—solvent. The carbazole may be suspended or dissolved in the liquid. Appropriate solvents are, for example, crude or purified light coal-tar oil, petroleum benzene, carbon bisulphide, carbon tetrachloride, or the like. The reaction is not dependent on certain conditions of temperature, as it occurs both in hot and cold solutions. The nitrous acid can be used in one of the known manners, either as nitrous anhydride in a gas mixture, or in solution, or as a nitrite and an inorganic or organic acid.

The crude anthracene is suspended in an indifferent liquid, or heated therewith until it dissolves, and is treated with the nitrous acid. The nitroso-compounds of carbazole and its homologues, such as phenyl-naphthyl-carbazole, thus formed dissolve. The solution is then filtered from the high-grade anthracene free from carbazole, which has remained undissolved, or has separated on cooling.

The filtered solution contains a small proportion of anthracene, all the easily soluble impurities like phenanthrene, and all the carbazole as nitroso-carbazole. The solution can be worked up either directly or after concentration, by distilling away a part of the solvent to yield technically valuable carbazole-derivatives and nitrous acid. For this purpose, the solution may be treated hot with sulphuric acid of specific gravity above 1·3, or cold with sulphuric acid above 1·7 specific gravity; whereupon the nitrous acid employed is quantitatively eliminated as nitric-oxide, while at the same time there is produced the green oxidation product of unknown, complex composition—insoluble in all solvents, which Zeidler obtained from solid nitroso-carbazole and concentrated sulphuric acid. The green oxidation product from nitroso-carbazole can be used for the manufacture of colouring matters.

The process is carried out as follows:—

Example I.—100 kilos. of ground crude anthracene (containing, for example, 32 per cent. of anthracene and 30 per cent. of carbazole) are mixed in a vessel, provided with a stirrer and a chimney, with 300 kilos. of light coal-tar oil and 14 kilos. of sodium nitrate—that is, 110 per cent. of the calculated amount. While continuously stirring, a quantity of dilute sulphuric acid of 16 per cent. strength equivalent to the sodium nitrate, is added in small portions, so gradually that no violent reaction occurs. The small quantity of nitrous gas which is evolved is mixed with air and water, to be recovered as nitrous acid. When the reaction is completed, the sodium sulphate formed is dissolved by the addition of water, and separated; and the high-grade anthracene is filtered from the coal-tar oil, washed with benzene, and dried.

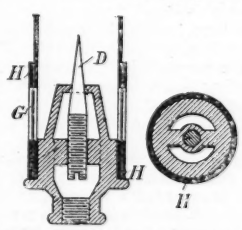
Example II.—1000 kilos. of 30 per cent. crude anthracene are dissolved in the smallest possible quantity (about 3000 kilos.) of hot benzene, in a boiler provided with a cooler, and under a hood. If the anthracene contains moisture, it is distilled to separate the water. Next, a finely-divided current of dry nitrous acid gas (obtained by mixing nitric oxide with sufficient air) is introduced, until all the carbazole has become nitroso-carbazole. After cooling, the anthracene is filtered off, washed with benzene, and dried. The solution containing the nitroso-carbazole is heated with sulphuric acid of 1·5 specific gravity, in quantity amounting to three times the weight of the nitroso-carbazole, whereby all the nitroso-carbazole is converted into the green compound described above. The nitric oxide evolved is conducted into a gasholder, and used as nitrous acid gas, as described above. The green compound is isolated by filtration and washing. The coal-tar oil remaining can be used again (either directly or after distillation). The acid can also be used again after it has been brought to the right degree of concentration.

The anthracene obtained according to these two examples has a purity of 75 to 95 per cent. according to the quality of the crude anthracene. If the carbazole-derivative is to be obtained of greater purity, the crude anthracene may be freed from the more easily soluble constituents before it is worked up. The nitroso-carbazole may be obtained as such from its solution in a pure condition by distilling the solvent and re-crystallizing.

The process is also applicable for working up the residues, containing carbazole, from other purifying treatment of anthracene, whereby high-grade anthracene and carbazole derivatives may be obtained.

Burners for Incandescent Gas Lighting.—Boult, A. J.; a communication from the Société Lumière Boule of Brussels. No. 3296; Feb. 15, 1901.

This invention relates to a high-pressure or bunsen gas-burner for incandescent lighting purposes, the special feature of which is an adjustable cone or "obturator," by the raising or lowering of which the section of the gas-outlet is correspondingly contracted or enlarged for the purpose of regulating the supply of gas. In this way, it is possible to construct the burner in one piece, and to place the cone in the interior of the burner so as to protect it against interference, since the burner must be first removed before the cone can be reached.



The nozzle of the gas-burner (made in one piece) is provided in its hollow tubular interior with a cross-bar having a central screw-threaded aperture for the reception of a cone D, which is vertically adjustable in it by a screw-thread. The point of the cone can thus be raised more or less through and above the gas-outlet, thereby more or less reducing the supply of gas to the burner. Over the burner-nozzle is placed a tube provided with orifices G arranged for the admission of air; while an encirling ring or sleeve H, with corresponding holes, can be so adjusted relatively to the holes of the burner tube, that the open space of the holes can be regulated according to requirements.

Bewdley Water Scheme.—Yesterday week, the Mayor of Bewdley (Mr. Langley Kitching) cut the first sod of the principal reservoir of the new water-supply scheme for the borough, in the presence of a large gathering. The reservoir is being constructed on a hill known as Mount Pleasant, about midway between Bewdley and Stourport; and thither the water will be pumped from a well which has been sunk on the Blackstone Farm, near to the River Severn, but proved by severe testing to be free from percolation of river water. The contract for the work is £10,600; and it is expected it will be completed in a year.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by correspondents.*]

Testings for Arsenic in Coke.

SIR,—I shall be glad if you will allow me to call the attention of chemists and others engaged in testing for the presence of arsenic in coal and coke, to the fact that they frequently contain another element which acts very much like arsenic—namely, selenium. It will no doubt be remembered that the element gives reactions so nearly like arsenic that it might easily be mistaken for it.

For those who have not made its acquaintance before, it may be well to point out that selenium forms seleniuretted hydrogen, which, like arseniuretted hydrogen, deposits the element on heated tubes and cold porcelain, as in Marsh's tests, and gives a black deposit on copper when a solution of a selenide or selenite is heated in the presence of hydrochloric acid. It also forms a lemon-yellow precipitate with sulphuretted hydrogen in the presence of hydrochloric acid, which is soluble in caustic alkalies and ammonium sulphide, from which it is reprecipitated on making the solution acid. If, however, the sulphide be heated, it gradually turns brown, giving a mixture consisting of selenium and sulphur, which, from its colour, might easily be mistaken for one of the tin sulphides.

There are reactions for detecting these elements in the presence of each other, which will be found in most good books on analytical chemistry. The methods given in some books for the estimation of arsenic would give wrong results in the presence of selenium if it were not previously known to be there.

I recently tested a sample of coke which gave reactions with sulphuretted hydrogen that at first appeared to be due to arsenic; but on heating the solution and sulphide for some time, the colour of the precipitate changed to a brown. This led to further investigations being made, the results of which showed that the sample contained no arsenic, but 0·015 per cent. of selenium.

The sample was from a district where the coke was said to contain arsenic; but from the results of my experiments, I am rather inclined to think that selenium may have been mistaken for arsenic.

April 19, 1901. JAS. F. SMITH.

Corruption.

SIR,—Every credit is, I am sure, due to you for the continued attention which is given to this unsavory but important question; and I venture to suggest two points which appear to me to bear very much upon the subject.

It does not seem kind to call in question the conduct of a large and worthy body of men; but does not experience teach us that the commercial traveller is, in many cases, the author of much of the mischief? I consider that, in these utilitarian days, in many trades—the gas-meter trade, for example—there is no need whatever for his services. The article sold is uniform in price and, among the best makers, also in quality, and no amount of commercial travelling can increase the number of orders; it can only divert them into different channels. Herein is the opening for mischief. Fire goods, tubes, and many other stores, come into the same category. The volume of orders, being controlled by the requirements of the district, is only partially affected by the business ability of the buyer, and not at all by the seller.

Then the innocent Christmas-box you refer to is wholly unnecessary, and an unfair tax upon any industry in which it is employed; and, liable as it is to gross abuse, why not attack it, and once and for all abolish it? Now that so many firms have done this with nothing but good results, it is a favourable opportunity for the manufacturers, who, I am sure, wish us well, to take a decided step in either of these two directions, and earn the gratitude, as they have now the respect, of the profession at large.

April 18, 1901. B.

"Our Lamps are Gone Out."

SIR,—There is to be seen at the present time, in one of the suburban residential districts of London, a variation in street decoration significant, if not artistic. To "the man in the street," judging only by appearances, it will be prophetic of impending doom to the gas lighting industry of Britain; but to those who know something of the *present* possibilities of gas illumination under progressive direction, it will be another painful object-lesson in "How *not* to do it."

The variation referred to is achieved by the erection of a companion lamp-pillar within a yard of each of those which have hitherto provided illumination for the streets. The new pillars are little different from the old ones—quite as ugly—but are fitted with electric lamps in place of the ancient feeble gas-burners which until now have misrepresented modern gas lighting. That the change is for the brighter was strikingly demonstrated on the two or three nights on which both systems did duty together. The electric light literally shone "*through*" the gas; but that gas was misrepresented is being practically demonstrated upon one or two of the gas-lamps which have been fitted with a pair of ordinary Welsbach burners, the illumination from which compares more than favourably with its electric neighbour, both for colour, brilliancy, and cost. Unfortunately, however, this demonstration has come too late. The rival is installed, and, in spite of cost or improvement in gas appliances, it will be difficult to oust.

If this striking example has the effect of awakening some of the gas authorities in time to prevent numerous repetitions of such a blunder, it will be some compensation for the painful reflections which this case suggests. How different it might easily have been! It is not sufficient to say, in effect, "We have a monopoly of this business. You can have a supply of our commodity if you wish, but we don't press you, neither do we trouble much how you use—or waste—it, so long as you pay up smart." Modern business methods and competition teach a different lesson; and happily some gas manufacturers have realized it, and keep to the fore. But the awakening forces have not yet by any means completed their work.

It is interesting to note the preparations that are being made to advance scientific knowledge in connection with the Glasgow Exhibition. It is to be hoped that advantage will also be taken of the opportunity of placing, in some very attractive way, before the millions of unscientific visitors, the present possibilities of gas for the use of the British working man's home, in comparison with the usual unscientific and extravagant methods still so persistently continued.

April 18, 1901. W. H. SHERBURN.

Power Gas in France.—In the article on this subject in last Tuesday's "JOURNAL," it was stated that Messrs. J. & O. G. Pierson, who are the agents for France and a portion of Belgium for Messrs. Crossley Bros., Limited, "are the Paris agents for, and manufacturers of, Crossley gas-engines:" We learn that this is incorrect, so far as the manufacture of the engines is concerned; all those sold by Messrs. Crossley's agents being made at the works at Openshaw, Manchester.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF COMMONS.

Thursday, April 18.

The Budget—An Export Duty on Coal.

The House resumed to-day after the Easter recess; and the most important event of the sitting was the introduction of the Budget by the Chancellor of the Exchequer (Sir Michael Hicks Beach). He proposed to raise by way of additional taxation the following amounts: Income-tax, £3,800,000; sugar, £5,100,000; and exported coal, £2,100,000—in all £11,000,000. He explained that he had endeavoured not merely to retain the existing proportions of direct *versus* indirect taxation, but also to improve them in favour of indirect taxation. In 1899, out of the taxation, reckoned on the regular basis, 48·4 per cent. was derived from direct, and 51·6 from indirect taxation. Last year, 49·3 per cent. was derived from direct, and 50·7 per cent. from indirect taxation. This year, the coal duty must be omitted from the comparison, because if it was paid by the producer it would be direct taxation, and if it was paid by the consumer, as he expected, it would be paid abroad. Omitting it from the calculation, the proportion this year would be 50·3 per cent. of direct, and 49·7 per cent. of indirect taxation—for the first time more of the former than the latter. The portion of the Chancellor's speech bearing upon the proposed duty on exported coal was as follows.

The CHANCELLOR OF THE EXCHEQUER: I now come to our proposal for a tax upon exported coal. It is a novel proposal; for it is of a kind that has been unknown in this country for 55 years. It is a tax which is not a direct tax in my mind, because it will not be paid, as I believe, by the producer of the article; nor, on the other hand, is it a tax which falls within the ordinary description of direct taxation, because I think it will not be borne by consumers in this country. It is a tax which will not affect the poorer parts of the United Kingdom, and it will not affect Ireland at all, except, perhaps, for the benefit of those who live there. It is an export duty of 1s. a ton on coal. I know the stock arguments against export duties; but I am not going to deal with them, for the simple reason that coal has always been accepted as a material occupying a unique position. It is not, like corn or wool, or cotton or timber, a raw material which the beneficence of Nature and the labour of man are continually reproducing. Coal once extracted from our earth is gone. It is capital, and not interest. On the other hand, it is not like those mineral ores, which are exported by many countries which cannot use them profitably for themselves. Coal is the life-blood of our industry; it is essential to the comfort of our great population. Without coal, our great industries would languish, and our population would diminish and decay. Coal has made Great Britain what she is, and the absence of coal is, in my belief, the main reason for the comparative poverty of Ireland. Therefore, two of the greatest men who during the last century dealt with the finances of this country have considered coal on a different footing from other matters. I refer to Sir Robert Peel and Mr. Gladstone. When Peel abolished these duties in 1845, he did it, not because he objected to the coal duty in itself (because, in the first place, the yield of it then was very small, the export being only 1½ million tons, and there being many exemptions), but mainly because it was his desire to establish the principle that there should be no duty leviable with regard to exports, and he did not think it would be wise to reserve coal as an exception. I cannot help thinking that if at that time the export of coal had amounted to 46 million tons, as it did last year, Peel would not have included in his proposals the abolition of the duty. We must not, in aiming at revenue, sacrifice trade; and I do not think a 1s. duty on coal will do so. Of course, our coal exports are an important item in our export trade. In 1845, after the repeal of the duty, they amounted to rather more than 2 million tons; and the duty amounted to 1½ per cent. of the total value of our exports. In 1889—that is, 44 years afterwards—they had risen to 5 per cent. of the total value of the exports; and in 1899 they had risen to 8 per cent. In 1900 (of course, in all these statements I do not include 11¾ millions exported last year for the use of ships on voyage), owing to the enormous advance in prices, and also to the rise of 7 per cent. in the exports of coal, the value of coal sent away amounted to 12 per cent. of the total value of our exports. Of course, we receive for our exports of coal goods from other countries; and this export provides remunerative freights for our shipping, enabling them to bring back commodities from foreign countries at lower rates than would otherwise be possible. But let the Committee consider where that trade goes to. I have said that the total exports of coal last year amounted to 46 million tons. Of this amount, 88 per cent. went to Europe and the countries bordering upon the Mediterranean. Russia, Scandinavia,

Germany, France, Spain, and Italy took two-thirds of the whole exports. Now let me remind the Committee that in that year, when the total amount of our exports of coal had risen by 7 per cent., there was an enormous increase in shipment prices f.o.b. I have examined the returns of exports of coal f.o.b. at 16 English, Welsh, and Scotch ports for 1899 and 1900, and I find that the increase per ton in 1900 as compared with 1899—a very good year for coalowners—was in few cases less than 4s. per ton, and ranged from 4s. to as high as 7s. 2d. a ton. And what were the average freights? I take the freights from two places, the Tyne and Cardiff, and compare them per ton in 1896 and 1900. From the Tyne to St. Petersburg they increased 3s. 6d.; to Sweden, 2s. 1d.; to Hamburg, 1s.; to Bordeaux, 1s. 6d.; to Portugal, 2s. 3d.; to Italy, 4s. 1d.; and to Egypt, 6s. From Cardiff the increases in freight in 1900 over 1896 were: To St. Petersburg, 4s.; to Germany, 1s. 8d.; to Bordeaux, 1s. 7d.; to Havre, 1s. 3d.; to Portugal, 2s. 9d.; to Italy, 3s. 7d.; and to Egypt, 5s. 4d. Remember, these are increases in freight, not the actual charges for freights. Now, had this any effect on trade? It had the effect of increasing trade. It might have been supposed that the American competition, of which we hear a good deal, would have diminished the British trade; for, whereas the average price of British coal in 1900 f.o.b. at ports of shipment was 16s. 3d. per ton, that of American coal at such ports was 10s. 6d. per ton. But we increased our trade to Europe in 1900, as compared with the preceding year, by no less than 3,500,000 tons, in spite of the advance in prices and freight. The American trade to Europe was greater by 600,000 tons. Practically, then, I think I have shown that we held the market. But that is not all. Our trade was not only able to bear this rise in price, it was also able to bear an import duty in those countries to which our coal goes. France, to which we sent last year 8,635,000 tons, or 2,000,000 tons more than in the previous year, charges 11⅞d. per ton import duty on our coal. Russia charges at her northern ports 1s. 11¾d. per ton. We sent to Russia 3,229,000 tons; to Spain, which charges 2s. per ton, 2,619,000 tons. Denmark charges 1s. per ton, and we sent her 2,125,000 tons; Portugal charges 1s. 6¾d., and we sent her 787,000 tons. Why is this? I contend that our coal is of a class, taking the bulk of it, which the European consumer cannot do without. That is certainly true of the coal in South Wales, which is almost entirely steam coal. I believe it is largely true of the coal in the North of England, which is gas coal of almost as superior a quality of its kind as the steam coal of South Wales. Therefore, I contend that the imposition of 1s. duty—which, let me point out, is infinitely less than the fluctuations in price over a long series of years during which our exports of coal have shown a continual increase—would do no real injury to our coal trade. I argue this from the facts of last year. But I am fortified in that argument by expert opinion; and the expert is fortunately also a member of this House. I refer to the honourable member for Merthyr (Mr. D. A. Thomas). In 1897 he wrote a very interesting book. I have read it with great pleasure as the product of one who is himself largely interested in this very trade, and who has the confidence of a considerable part of the population in South Wales, who are also largely interested in it. The conclusions at which the honourable member arrived—stated, as they were, at a time of depression in the trade—are peculiarly applicable to the present moment, when prices, of course, have largely fallen as compared with what they were last year. He wrote, of course, of steam coal alone, which formed nearly the whole of the Welsh export of 18 million tons last year, and also forms a very large part of the exports of the whole country. He thought that in 1897 we were selling that coal to the foreigner too cheaply, and that a very simple combination among the producers to fix the price——

Mr. D. A. Thomas: Not to fix the price. I abstained from fixing any price.

The Chancellor of the Exchequer: Well, let us say to raise the price, which would easily make the foreigner pay 2s. per ton more than he was paying then without any risk of losing the trade.

Mr. Thomas: It was at a time of depression, and very different from what it is now.

The Chancellor of the Exchequer: Quite so. So much the better for me. The honourable member pointed out in his book that steam coal is an article of prime necessity to the consumer. He did not believe that the temporary depression in price which existed in 1897 had been brought about by foreign competition; and I think events have proved that he was right. He pointed out the great advantages which our exporting collieries had as compared with the European coal companies in their proximity to seaports (there can be no doubt of that). He also showed, by an admirable argument, that Welsh coal has practically a monopoly in the markets to which the bulk of it is shipped; that among such markets the only place where it meets with serious competition is the Baltic, where its competitor is our own north country coal; and that therefore Welsh and north country coal producers may safely raise their prices to a remunerative level without running serious risks of materially affecting the demand. Of course, the honourable member is not infallible; but he is a great authority, and I accept his argument with one difference, that when he and his friends raise the price of their exported coal by 2s. per ton, I ask them to give me half of it. (Laughter and cheers.) Of course, it may be said that the honourable member's views and my argument may be perfectly true of the better class of coal which is exported from this country, but that there is an inferior sort exported in which we can have no monopoly at all. With regard to that, I think I may remind the Committee that in the years between 1842 and 1845, when there was a duty of 1s. per ton on small coal, the exports of small coal very largely increased, although at that time it was said to be worth no more than 1s. 6d. per ton at the pit mouth; and the average price of our exports of coal at the present day shows, I think, clearly that the exports of coal of low values must form a small proportionate amount of our whole exports. But supposing the increase in the export trade of coal in this country was checked—supposing it was diminished—I am not quite sure that even that result would be an unmixed evil. What would happen? Either that the coal would continue to be produced, in which case it would be sold more cheaply to the consumer here, or it would not be produced, and then it would be husbanded for future consumption. I am not a believer in the approach, within any time that we can foresee, of the exhaustion of our coalfields. But I think that a portion of those fields which can be cheaply worked has in some parts of the country already come perilously near exhaustion, and that we may be within measurable distance of a time when, owing to this, the increased price of coal may be so great as to be a material injury to our industries and to the bulk of our population. If there were any force in that view, any check in the increase of our exports, or even some diminution, would not be an unmixed evil to the country as a whole, whose interests must first be considered, whatever might be the immediate effect upon the owners or miners of coal. I have said that, in my judgment, this duty will fall on the consumer abroad. Among these consumers, however, we must not forget that there is our own shipping interest. They not only take their bunker coal, on which the duty would not be levied when they start on voyages from this country, but stores of coal are sent to different places abroad, which they purchase for their use when they arrive at those places. I do not think it would be feasible, I must own, to make an exemption on behalf of our shipping industry in this matter. But the additional price which they would have to pay for their coal would be but a small percentage on its cost at the foreign port at which they have to buy it, and the burden that it might impose on the shipping industry would be the merest trifle when compared with that put upon that industry by the great increase in the price of coal last year or on previous occasions; and I must say that, having regard to the enormous profits which the shipping industry has been making of late years, and to the fact that it, of all the industries in this country, may be fairly expected to make some contribution—some special contribution—towards the increasing cost of our Navy, I do not think I am asking too much if I ask it to bear this small additional burden, for, after all, its representatives can relieve themselves of it to a great extent if they choose. This coal is exported, as I have shown, mainly to ports in Europe and the Mediterranean. They are short voyages. If the merchant chooses, he can devote more bunker space in his ship to coal and less to his cargo, and so escape the duty.

The motion sanctioning the imposition of the duty as from the 19th inst. was carried by 171 votes to 127.

Friday, April 19.

THE EXPORT COAL DUTY.

Mr. Plummer asked the Chancellor of the Exchequer whether he would be prepared to consider the question of exempting from the export duty on coal contracts already entered into, in view of the fact that such duty, if persisted in, must necessarily fall on the exporter, and could not be recovered in the price to be paid by the buyer abroad.

The Chancellor of the Exchequer replied that he was considering the matter with the members of the Board of Customs; and he hoped to have the advantage of some communications on the subject that evening from the honourable member and those associated with him.

At a later period of the sitting,

Mr. D. A. Thomas asked the Chancellor of the Exchequer whether he was aware that business at Cardiff was at a standstill that morning in consequence of the uncertainty prevailing in reference to the coal duty and its effect on contracts; and he asked the right honourable gentleman, in view of the importance of the trade to the mining and shipping interests, to lose no time in making the precise position known.

The Chancellor of the Exchequer: I think the honourable member is confusing two matters—the liability for the duty in the first instance, and the ultimate incidence of the duty. The payment in the first instance is clear, and the question of exemptions, so far as existing contracts are concerned, is a matter which, as I have explained, I have under consideration, and I hope shortly to make an announcement to the House. Meanwhile, so far as I can see, there is no reason why the duty should not be paid in Cardiff as elsewhere.

The Birmingham Gas-Tube Contract Goes to South Wales.—It may be remembered that some time ago reference was made in our columns to the fact that the Gas Committee of the Birmingham Corporation had been compelled, owing to the high price of British material, to buy American-made weldless steel gas-tubes. It is now reported that a South Wales firm, taking advantage of the present labour difficulty in the South Staffordshire tube trade, have made arrangements to manufacture gas-tubes. In quality, this firm's output is stated to equal that of the American material, while the price is lower. They have accordingly secured the Committee's contract.

Scunthorpe Water Supply.—The water supply of Scunthorpe is obtained at present from shallow surface wells, which are constantly in danger of contamination. About two years ago, the Urban District Council decided to sink a deep boring as a source of water supply. After many unexpected difficulties, it was made to the depth of 1517 feet, well into the red sandstone, and lined with tubing for most of the distance. The yield tests have just been made, and were satisfactory —287,000 gallons per day being obtained. Two samples of water were submitted for analysis, and the result is a great disappointment. The water is organically pure, but brackish; it is much too hard for domestic purposes, and too saline to drink. The boring contract amounted to £5000.

Kimberley Water-Works Company, Limited.—At the annual meeting of this Company, held in London last Wednesday, the Chairman (Mr. C. J. Jackson) said that, notwithstanding the exceptional circumstances of the past year, the Company had done a good business. The siege of Kimberley was raised on the 15th of February, and within two or three days they regained possession of their pumping-station; and on the 2nd of March they resumed the distribution of water to their customers. The presence of British troops had meant profit to them rather than otherwise; and save for the first two months of the year their sales of water were greater than ever before, except in 1897. They would have to face the lapse of their concession four years hence; but before that event occurred, they hoped to have sold out to the Kimberley Corporation. They had been awarded £3214 compensation as the result of the war. The report was adopted, and a 5 per cent. dividend was declared.

MISCELLANEOUS NEWS.

PARIS GAS COMPANY.

Report and Accounts for the Year 1900.

The following is an abstract translation of the report of the Directors of the Paris Gas Company on the working of the undertaking in the year ending the 31st of December last, with the principal items in the accounts. The general results were briefly noticed in the "JOURNAL" last week.

The report opens with a reference to the great event of the past year for Paris—the holding of the Exhibition; and the Directors remind the shareholders that these international displays have always caused a considerable increase in the consumption of gas. In 1867 it was 14,235,157 cubic metres; in 1878, it reached 20,752,289 cubic metres; in 1889, it was only 14,560,250 cubic metres; whereas in 1900, it was 24,039,617 cubic metres—the equivalent cubic feet being in round numbers 502½, 732½, 514, and 848½ millions respectively. The increase last year, therefore, was to the extent of upwards of 3,200,000 cubic metres more than in 1878, notwithstanding the competition offered to gas since that date by other methods of illumination The reason is to be found in the fact that, apart from the progress made in its application for lighting purposes, which was fully demonstrated in the Champ de Mars and at the Trocadéro last year, gas has proved itself to be a valuable agent for the production of heat and motive power. For a long time the Directors have endeavoured to lead the consumers to appreciate the services which gas is capable of rendering from this dual standpoint; and their efforts have certainly not been barren of results. This is shown by the augmentation which has taken place in the consumption of gas in the daytime; for while in 1899 the total output was only 325,874,001 cubic metres, or 11,503,352,000 cubic feet, last year it rose to 349,913,618 cubic metres, or 12,351,951,000 cubic feet—an increase, as stated above, of 24,039,617 cubic metres, or about 848½ million cubic feet—the day consumption rose from 109,335,483 cubic metres, or about 3863 million cubic feet to 123,717,084 cubic metres, or 4367¼ millions—in other words, from 33·55 to 35·35 per cent. of the total.

The revenue from the sale of gas in the twelve months ending Dec. 31 last was 89,242,447 frs. (£3,569,698), or 6,611,711 frs. (£264,468) more than in the preceding year. Of the total, 81,107,727 frs. came from the city, and 8,134,720 frs. from the surrounding districts. The number of consumers at the close of the year was 454,585, or 29,309 more than at the corresponding period of 1899, in which year 27,636 new customers were entered in the books. This increase of 1673 on the figures for 1899 bears testimony to the appreciation of the Company's system of free supply of fittings by the classes for whose special benefit it was introduced. These figures show that the Exhibition was not the only cause of the augmentation in the consumption of gas which took place last year. It was due also, and in a large measure, to the regular growth of the business, as will be seen from the following figures: In 1899, the number of small consumers was 140,776; in 1900, 160,089—an increase of 19,313, or 1829 more than that of the previous year. In 1899, the number of ordinary consumers was 284,500; in 1900, 294,496—an increase of 9996, and practically on all-fours with that of the preceding twelve months, when it was 10,152. Both classes of customers, therefore, contribute simultaneously to the progress realized by the Company.

The number of burners in the public lamps on Dec. 31 was 63,040, of which 50,756 were employed in lighting the city, and 12,284 were in use in the suburbs; being an increase of 631 (240 in Paris and 391 outside). In 1899 there was a large decrease of 3375 burners in the city, owing to the inclusion of certain public thoroughfares in the area of the Exhibition. Last year the substitution for the ordinary 5-feet and recuperative burners of those of the Auer, Denayrouze, and St. Paul types was continued; the number of the different kinds of burners employed at the close of the year being as follows:—

Kind of Burner.	1899.	1900.	Inc.	Dec.
Ordinary	38,599	31,008	—	7,591
Auer	8,735	15,518	6,783	—
Denayrouze	1,877	2,984	1,107	—
St. Paul	1,164	1,109	—	55
Regenerative	141	137	—	4
Total	50,516	50,756	7,890	7,650

The changes thus effected have necessarily improved very materially, and without any additional cost to the Municipality, the lighting of the public thoroughfares of the city; and the work is still being pushed forward vigorously.

The number of rising mains fixed by the Company last year was 1100; bringing up the total to 49,300. From these mains 315,698 consumers were supplied on the 31st of December, against 288,441 at the corresponding date in 1899; being an increase of 27,257. Of the entire number of consumers (454,585), those on the rising mains were 69·45 per cent., against 67·82 per cent. at the close of 1899. The quantity of gas consumed by them was 65,477,837 cubic metres, or about 2311½ million cubic feet, against 57,364,286 cubic metres, or, in round figures, 2025 million cubic feet, in 1899; being an increase of 8,113,551 cubic metres (286,408,000 cubic feet), as compared with 1,874,748 cubic metres (66,178,000 cubic feet) in the preceding year. A portion of this very large additional consumption must be attributed to the prolonged residence in Paris of consumers engaged at the Exhibition. At the same time, the augmentation in the number of ordinary consumers on the rising mains (7553 against 7396) affords proof that the growth of the Company's business continues uninterruptedly.

With regard to the works and plant, no extensions were carried out last year; the appliances at the various stations being equal to the demands made upon them. Extensions of mains were necessarily called for; and about 40,833 yards of pipes were laid—31,036 yards in the city, and 9797 yards in the suburbs. The total is greater by 16,055 yards than that for 1899, owing to the alteration and renewal of mains necessitated by the Metropolitan and other railway works in progress in Paris. The expense attending these operations have been repaid to the Company by the various parties concerned. Then the Exhibition required a provisional service of mains, extending altogether to 21,563 yards—18,451 yards in connection with the Exhibition itself, and 3112 yards for the annexe at Vincennes. Nearly four-fifths of these pipes will be taken up, and the Company will receive compensation in accordance with an agreement entered into with the Exhibition authorities; so that no loss will be incurred. The rest were put down in the ordinary course of business. Consequently, the total length of mains was increased last year to 2,752,953 yards—1,813,879 in Paris, and 939,074 in the various suburbs. There was a net sum of 5,269,137 frs. expended for capital purposes last year; and at the close the account stood as follows:—

	Francs.	Sterling.
Amount expended to Dec. 31, 1899	324,743,900	£12,989,756
,, ,, during 1900	5,269,137	210,765
	330,013,037	£13,200,521

To meet this there has been raised: By shares, 84,000,000 frs.; by bonds, 254,004,189 frs.—together, 338,004,189 frs. To this must be added a sum of 2,246,799 frs. taken from revenue to meet capital expenditure exceeding 3,200,000 frs.; making in all 340,250,988 frs. (£13,610,039). There is consequently an unexpended balance of 10,237,951 frs. (£409,518). The capital is represented by 336,000 shares and 553,332 bonds. At the date of the report, there had been redeemed 246,163 shares and 364,012 bonds; so that 89,837 shares and 189,320 bonds remain for redemption before the expiration of the concession on Dec. 31, 1905.

The following is the working account for the past year:—

Expenditure.

	Francs.	Sterling.
Value of gas in store on Jan. 1, 1900	33,149	£1,325
Manufacture of gas—		
Coals carbonized	24,263,922	970,557
Coke and tar for heating purposes	5,199,362	207,974
Salaries and wages	5,399,463	215,979
Maintenance of works and plant	2,018,075	80,723
Incidental expenses of carbonization	1,455,991	58,240
Purifying materials and labour	379,096	15,164
Distribution—		
Salaries of Engineers and officers	2,885,196	115,448
Repairs, &c., of mains and services	1,645,851	65,834
Miscellaneous expenses, stamps, &c.	592,765	23,711
Gratuitous installations of fittings	2,316,232	92,649
General management (including interest and sinking fund payments and 2,246,799 frs. carried to capital account)	24,794,337	991,773
Pension and provident funds	1,928,442	77,138
Municipal charges—		
Tax of 2 c. per cub. met. of gas sold	5,921,434	236,857
Rent of subsoil occupied by mains, &c.	200,000	8,000
Lighting, extinguishing, and maintenance of public lamps (less amount paid by Municipality)	1,455,330	58,213
State charges—		
Official gas testing, stamps, &c.	1,107,913	77,138
Total expenditure	84,937,158	£3,397,486

Revenue.

	Francs.	Sterling.
Value of gas in store on Dec. 31, 1900	40,107	£1,604
Sale of gas	89,242,447	3,569,698
Residual products—		
Coke	18,489,370	739,575
Tar	1,678,382	67,135
Ammoniacal liquor	2,514,876	100,595
Rental of meters and fittings on hire	2,148,943	85,958
Interest and discount	1,323,691	52,948
Total revenue	115,437,818	£4617,513
Deduct expenditure	84,937,150	3,397,486
Balance, profit for 1900	30,500,660	£1,220,027
Add balance from 1899	97,570	3,903
	30,598,230	£1,223,930
Deduct to meet outstanding claims	298,230	11,930
Balance available for distribution	30,300,000	£1,212,000
Deduct for share dividend	11,200,000	448,000
Balance, divisible equally between the Company and the Municipality	19,100,000	£764,000

The total amount coming to the shareholders is therefore:

	Francs.	Sterling.
Dividend as above	11,200,000	£448,000
Half of divisible balance	9,550,000	382,000
Placed to shareholders' credit, as per resolution of March 23, 1875	50,000	2,000
Balance of undivided profits	210,840	8,434
Total	21,010,840	£840,434
Deduct 1 fr. per share for reserve fund (336,000 frs.) and the complement of the share redemption fund ordered by the State Council to be borne by the shareholders (2,883,543 frs.)	3,219,543	128,782
Balance	17,791,297	£711,652
Deduct interim dividend of 12 frs. 50 c. per share paid in October last	1,316,512	52,660
Balance	16,474,785	£658,992

This allowed of the payment of a final dividend of 48 frs. 50 c. per share, making 61 frs. for the year; leaving a balance of 178,782 frs. (£7151) to be carried forward. The dividend was 2 frs. per share higher than that declared last year, owing partly to the impulse given to business by the Exhibition, to the development of the commerce and industry of Paris, and to the constant exercise of economy in the management of the affairs of the Company by the directorate.

Following the accounts is the portion of the report dealing with the raw material and the residual products. The effect of the advance in the price of coal which took place at the close of the year 1899 was felt during the whole of the twelve months under review, but more keenly at the outset and in the middle of the year. Since the commencement of 1901, however, there has been a downward tendency in prices. Thanks to the existence of the long contracts entered into by the Directors, they were fortunately enabled to pass through the crisis with a comparatively small increase in their outlay for coal. With regard to coke, its sale produced 18,489,370 frs. (£739,575), or 3,531,709 frs. (£141,269) more than in 1899, notwithstanding that the price was kept very little higher than that of similar kinds of fuel; and though the winter was a mild one, the sales were larger than before. Tar, ammoniacal liquor, &c., yielded 4,193,258 frs. (£167,730), against 3,488,713 frs. (£139,548); being an increase of 704,544 frs. (£28,182), due mainly to the improved prices obtained for ammoniacal products. There was no change in the market for tar and its derivatives.

The Company's show rooms continue to be visited by large numbers of people. Last year, as many as 40,505 inspected the appliances on view, and 6637 orders were booked—1931 being for stoves made by the Company, and 4706 for those supplied by other makers. The proportion of heating and cooking stoves disposed of was much larger last year than in 1899; being 4736 against 2715. The same may be said of all kinds of appliances used for industrial purposes in which solid has been replaced by gaseous fuel. No less than 5,849,642 cubic metres, or about 206½ million cubic feet, of gas were burnt in this way during the past year in Paris and its suburbs. The Directors encourage to the fullest possible extent the use of gas for industrial purposes; and they point out that its fixed rate should cause it to be preferred to fuels which fluctuate in price. The utilization of gas for the production of motive power continues to extend. At the close of last year, there were in use 3184 gas-engines, furnishing 13,316-horse power; being an increase of 195 engines and 726-horse power as compared with the position at the close of 1899. They used 10,840,000 cubic metres, or rather more than 382½ million cubic feet of gas; being an advance of 741,000 cubic metres, or about 26 million cubic feet, on the figures for 1899. The Directors refer to the two large engines—one of 500 and the other of 1000 horse power—which attracted so much attention at the Exhibition, and remark that no appreciable improvement had been made in them so far as economy in consumption was concerned—an essential condition for ensuring the more general use of these motors. Nevertheless, the results achieved in Paris last year afford ample proof that users of motive power for industrial purposes appreciate more and more the undeniable advantages of these simple engines.

The next section of the report deals with the part taken by the Company in the Exhibition. This is too well known to most of our readers to need further detailed reference; but it may be useful to place on record the Directors' account of their work in connection with that gigantic display. A scheme for lighting the Champ de Mars and the area in front of the palace of the Trocadéro was prepared by the officials of the Company in conjunction with the Exhibition authorities, and it received the approval of the Minister of Commerce on Sept. 30, 1898. The burners employed were those of Bandsept and Denayrouze, carrying Welsbach mantles, and supplied with gas at a pressure equal to, or higher than, that usually employed. There were 1076 standards supporting 1618 lanterns furnished with 4649 burners, which yielded a light equal to 91,900 carcels, or about 882,000 candles. The area illuminated was some 120,000 square yards in the Champ de Mars and 114,000 at the Trocadéro. The shareholders of the Company had good opportunities of witnessing the effect of this brilliant display of gas-light; and the Directors acquaint them, through their report, with the gratifying fact that the foreign gas engineers who were in Paris on the occasion of the International Gas Congress in September were unanimous in testifying to the immense success obtained by the Company with their special display, when compared with the various methods employed in lighting other parts of the Exhibition. In their opinion, the Company had demonstrated victoriously the progress made since 1899 by the application of the incandescent system to public lighting, and had thereby rendered unquestionable service to the gas industry. This was the chief object of the Directors' efforts; and they were fully satisfied with the result. But they did not confine their attention to lighting. They profited by the opportunity afforded by the Exhibition to encourage in a very special manner the extension of the use of gas for culinary and warming purposes in the various restaurants and cafés there. The quantity of gas consumed in certain of these establishments was considerable—reaching nearly 5¼ million cubic feet, and being in all cases more than 700,000 cubic feet. A still more interesting result was the further proof afforded of the easy applicability of gas, the economy resulting from its employment with well-made appliances, and the improved hygienic conditions it ensures—a matter of the highest importance to those who have to use it. The orders which the Directors are now receiving lead them to hope that the Company will derive the benefits they anticipated from this experiment on a large scale; and not only the Company, but those makers of gas cooking and heating appliances who, under all circumstances, co-operate so usefully with them. While on the subject of the Exhibition, the Directors remind the shareholders that they voted last year a sum of 400,000 frs. (£16,000) for distribution among all the workmen, and among those of the officers whose salaries were at or below 2600 frs. per annum, to enable them to meet the additional expenses they would have to incur owing to the rise in the price of provisions. This considerate action was greatly appreciated by the parties specially concerned.

The report furnishes, as usual, full particulars in regard to the provident, pension, and savings funds connected with the Company. Last year the expenses of the provident fund amounted to 560,179 frs. (£22,407); whereas the receipts—consisting of 1 per cent. deducted from the Directors' attendance fees and the salaries of the officials, 212,092 frs., and a like sum contributed by the Company, together with miscellaneous receipts, 14,611 frs.—were only 438,795 frs. (£17,552). There was consequently a deficit of 121,384 frs. (£4855), which was charged to the year's working. There are two pension funds in connection with the Company—one for the workmen and the other for the clerks, &c. The amount of the former at the close of the year was 1,084,631 frs. (£43,385); and of the latter, 10,880,393 frs. (£435,216). Portions of each of these funds are invested in the Company. The balance of the savings fund on Dec. 31 was 293,058 frs. (£11,722).

The rest of the report is occupied with the dispute between the Company and the Municipality, on the subject of the bearing of certain clauses of the Treaty of 1870 on the amortization of the share capital, and the interminable question of the reduction in the price of gas. The former, as already recorded in the "JOURNAL," was settled adversely to the Company; and the latter is in temporary abeyance, awaiting some proposal for reopening negotiations.

MANCHESTER CORPORATION GAS SUPPLY.

Decreased Profits.

The Chairman of the Gas Committee of the Manchester Corporation (Alderman Gibson) presided over a meeting of the Committee last Tuesday, at which the estimates were adopted. The income for the current year was put down at £713,000, and the expenditure, in round figures, at £702,000; so that a profit of only about £11,000 is likely to be forthcoming in relief of the rates. Last year there was a proposal on the part of the Committee to allocate only £20,000 in relief of the rates. This was objected to; and in order to hand over £50,000 for the purpose, the price of gas was raised 3d. per 1000 cubic feet. The actual sum paid to the rates during the year just closed was £51,900. The chief reason for the falling off in the profits is found in the fact that the full effect of the increased price of coal will be felt in the current year. This state of things was foreseen a year ago by the Lord Mayor, when he said that if the Council did not raise the price of gas 3d., they would be obliged this year to make the increase 6d. or 7d. per 1000 cubic feet. Another reason is the higher cost of labour. Then there has been scarcely any increase in consumption. The total cost of the coal carbonized during one year at prices now current will, it is said, be £115,000 more than it would be at the prices prevailing two or three years ago. In making the estimates for the current year, the Committee have taken the most favourable view of the future; and they have no fear that the profit will be less than £11,000.

METROPOLIS GAS SUPPLY.

Dr. A. W. Williamson's Quarterly Report.

The following is an extract from the report of Dr. A. W. Williamson, the Chief Gas Examiner for the Metropolis, on the quality of the gas supplied in the quarter ended the 31st ult.:—

I. *Illuminating Power.*—The average lighting power of the gas made by the three Companies was higher than the parliamentary standard at all the stations. The maximum, minimum, and average were as follows:—

	Max.	Min.	Aver.
The Gaslight and Coke Company—			
Fenchurch Street, E.C.	17·7	15·70	16·6
Tudor Street, E.C.	16·5	15·43	16·1
Aldersgate Street, E.C.	16·9	16·00	16·3
Ladbroke Grove, W.	17·0	16·10	16·4
Vincent Terrace, N.	17·7	16·30	17·0
Carlyle Square, Chelsea	16·8	15·74	16·2
Camden Street, N.W.	16·9	16·00	16·2
Graham Road, Dalston	17·4	15·87	16·7
Kingsland Road, E.	17·9	16·00	16·9
Spring Gardens, Charing Cross	16·7	16·00	16·1
Vinery Villas, St. John's Wood	17·3	16·40	16·7
Lambeth Road, S.E.	17·0	16·00	16·3
Hornsey Road, N.	17·2	15·53	16·3
George Street, Hampstead	17·5	15·80	16·4
Commercial Gas Company—			
Wellclose Square, E.	17·8	16·00	16·7
Parnell Road, Old Ford	17·1	15·82	16·3
South Metropolitan Gas Company—			
Bedford Road, Clapham	17·2	15·60	16·3
Stoney Lane, Tooley Street, S.E.	17·7	15·49	16·6
Lewisham Road, S.E.	17·3	15·74	16·6
Blackfriars Road, S.E.	16·9	16·00	16·5
Burrage Road, S.E.	16·9	16·20	16·4

II. *Purity.*—The maximum, minimum, and average quantities of sulphur per 100 cubic feet of gas at the various testing-stations during the quarter were as follows:—

	Max.	Min.	Aver.
The Gaslight and Coke Company—			
Fenchurch Street	19·5	8·1	13·3
Tudor Street.	20·0	9·9	13·3
Aldersgate Street	14·9	7·9	12·2
Ladbroke Grove.	14·8	8·8	12·0
Vincent Terrace.	11·9	4·7	8·1
Carlyle Square	16·1	6·0	10·9
Camden Street	20·1	10·4	13·8
Graham Road	11·3	8·7	10·0
Kingsland Road.	20·3	10·4	14·8
Spring Gardens	15·3	4·9	10·4
Vinery Villas.	17·5	11·7	14·3
Lambeth Road	15·7	6·4	9·8
Hornsey Road	11·4	7·5	9·6
George Street	16·7	4·4	9·3
Commercial Gas Company—			
Wellclose Square	13·8	5·9	8·5
Parnell Road.	19·8	7·9	12·7
South Metropolitan Gas Company—			
Bedford Road	23·0	11·7	15·9
Stoney Lane.	24·8	7·6	14·9
Lewisham Road.	20·8	10·8	15·5
Blackfriars Road	23·0	8·0	14·3
Burrage Road	19·8	11·9	15·4

The average quantity of sulphur present in the gas was considerably less during the quarter than that permitted—viz., 22 grains per 100 cubic feet—at all the stations. Sulphuretted hydrogen was not present on any occasion. Ammonia was generally present, but only in slight quantities.

THE PROPOSED EXPORT DUTY ON COAL.

Adverse Criticism.

The resolution of the House of Commons last Thursday to put a duty of 1s. per ton on exported coal, as recorded in our "Parliamentary Intelligence," has given rise to a good deal of adverse criticism by the parties interested.

The Chancellor of the Exchequer received at the House of Commons on Friday a deputation of Unionist members representing constituencies in the north-east of England who were desirous of urging upon him that grave hardship must be produced by the coal-tax where contracts for export had already been entered into. It was stated that in these cases millions of tons were concerned, each ton of which, if the tax were enforced, would represent a loss of 1s. to the contractor. Sir Michael Hicks-Beach admitted that a case had been made out for sympathetic consideration; and he gave the deputation to understand that some rebate would be granted, though he did not pledge himself to the amount or the period over which it would be extended.

At a meeting of the Executive Council of the Mining Association of Great Britain held last Friday—Captain W. B. Harrison, of Cannock Chase, presiding—a resolution was unanimously passed to the effect that the colliery owners of the kingdom view with the greatest alarm the proposal of the Government to impose an export duty of 1s. per ton on coal; that such impost would most seriously injure the principal exporting districts, besides which it would react on every district in the kingdom, and would be most prejudicial, not only to the employers, but to the workmen; that the result would inevitably be most seriously to prejudice the whole trade of the country in competition with foreign coal; that great hardship and loss would be entailed, particularly on those colliery owners who have already made contracts; and that the shipping trade and freights would be adversely affected to a very serious extent. The resolution concluded by urging the Government to reconsider the proposed export duty.

The Cardiff Correspondent of "The Times" says that all concerned in the South Wales coal trade are clamouring for pressure to be brought to bear upon the Government to withdraw the impost on exported coal or, at least, to modify it to the extent of exempting running contracts. A meeting of coalowners was held under the presidency of Mr. Henry Lewis, last Friday afternoon, when a resolution was unanimously adopted protesting against being compelled to give any guarantee or bond for the payment of the new coal-tax, which was an obligation falling on the actual owner of the coal at the time of the export. As to the incidence of the tax, there is a conflict of opinion between the owners and the merchants. Colliery companies sell f.o.b., but the contracts stipulate ports to which the coal is to be sent. Therefore, the middleman, although he is the charterer of the ship, contends that the owner is the real exporter; while the owner holds that he has fulfilled his obligation by putting the coal free on board, and that export does not begin until the vessel leaves port. The Swansea Chamber of Commerce, at an emergency meeting on Friday, protested against the duty as being an unwarranted new departure, since it operated on the shipping branch of the coal trade only.

A meeting of the members of the Newcastle Exchange was held on Friday, to protest against the imposition of the tax. Sir W. H. Stephenson presided, and the following resolution was carried: "That this meeting of the members of the Newcastle Exchange requests our members for the North of England in the House of Commons to approach the Chancellor of the Exchequer and endeavour to obtain a remission of the duty on coal and coke on contracts made prior to April 18." A resolution was also carried protesting against coal being singled out for the imposition of a duty.

In Liverpool, the new coal duty has been generally well received. The iron and steel industries of the Midlands have suffered greatly during the past twelve months through the high prices which colliery proprietors have exacted, and anything which is even remotely calculated to modify the stringency of supply is welcomed.

A correspondent in the City expressed his views on the new coal and sugar duties in a letter which appeared in "The Times" on Saturday. In the course of his remarks, he referred to the competition of American and other coal with our own as follows: "Already American coal is invading markets of which we have hitherto enjoyed the monopoly; and the extra 1s. per ton will in many cases turn the scale in their favour. Their sales in the Mediterranean, Portugal, and the Canary Islands are steadily increasing; and in Brazil they are rapidly taking the position we have so long occupied. American coal is being sent from Norfolk (Va.) to the Brazils at under 10s. per ton, which is many shillings per ton below the price at which Welsh coal can be offered; while agents from the States are at present here endeavouring to obtain the custom of the South American Railways, by offering to deliver coal at Buenos Ayres at 24s. per ton. Our position on the west coast of South America has already been occupied by Australia; and Japanese and Indian coals are formidable competitors in eastern waters. Therefore, it will readily be seen that much of the coaling business which we at present do may be diverted to other quarters. . . . It is not only the coal trade which we are in danger of losing, but also the various profits and wages which are obtained in handling the cargoes and in victualling and storing the ships. Such sums probably far outweigh any possible advantage which the home consumer is likely to obtain from the larger supplies which may be available in consequence of the diminished foreign shipments."

Mr. B. Pickard, M.P., President of the Miners' Federation of Great Britain, and Secretary of the Yorkshire Miners' Association, expressed the opinion at Barnsley on Friday that the duty on coal would bring about a reduction in the export trade, and that there would be either a big slump in the home trade, with a great reduction in price, or the pits would be stopped so as to regulate supply and demand. Probably the latter would be the result. If a diminished demand followed from other countries, and some of them could meet their own trade, the result would be that English coal would cost 1s. to 1s. 6d. per ton more to those who were forced to buy it; and if the employers and men agreed to a re-adjustment of the output, the prospects expected by the Chancellor of the Exchequer would fade away Probably for a period the shipping trades would have to bear much of the loss on present contracts; but the result of the tax would be a reduced output, a smaller number of hands at the collieries, fewer ships, and loss of capital in ships in dock or wharves.

Sir James Joicey says: "No doubt, in the first place, the coalowner and the merchant will have to bear a considerable part of the duty; but that will be for a very brief time. . . . The shilling will ultimately be paid in large part by the miners. What this Budget does is to cast on a section of the mining community—which in the aggregate does not amount, I believe, to more than 200,000 men—one-fifth of the new taxation for the war. One-fortieth of the population will pay one-fifth of the amount raised for the war."

The proposed tax on coal has caused a bitter feeling in the coal trade of the North-east of England, whence about 14 million tons are sent abroad annually. A large proportion of Durham coal is shipped at Sunderland by exporters, who before the end of March have entered into their yearly contracts at prices which leave a margin of about 3d. per ton. Thus the tax will mean an enormous loss on present contracts. In Northumberland the proposal is unanimously condemned. Its adoption, it is believed, will menace the existence of the industry, as the markets there are almost exclusively foreign. Mr. J. Wilson, M.P., Secretary of the Durham Miners' Association, has expressed the opinion that the new impost is bound to throw men out of employment, more especially in the large exporting districts. Mr. Samuel Woods, the Lancashire miners' agent, puts the number at 100,000, because the tax will, he says, paralyze our export trade. The views of our Newcastle correspondent will be found in our "Coal Trade Reports."

On the Coal Exchange last Friday, a member of a firm largely engaged in the export of South Wales coal made the following remarks to a representative of the Central News: "The blow would fall heaviest on Durham and Scotland, and I will tell you why. We can always find a market for South Wales coal, but the northern collieries depend very greatly on the Continent; and with an additional 1s. on the ton, difficulty would be found in competing with the Belgian and German coal. After the present contracts have been executed, Welsh coal may be able to hold its own, even with an additional 1s.—that is to say, if the coalowners intend to increase their prices to meet the tax. But that I very much doubt. My opinion is that the miners will have to pay the tax, and that belief is borne out by a very general opinion expressed to-day." Other members, however, asserted that the tax would not appreciably diminish the volume of exports. In any case, it was recognized that the position of those who had contracts running was largely complicated by the duty, and that many collieries and middlemen would suffer to a material extent unless some compromise were possible.

Mr. D. A. Thomas, M.P., intends to move a series of amendments proposing to exempt coal shipped under contracts entered into prior to the imposition of the duty; to exempt coal shipped to British possessions; to give drawbacks to all coal shipped for the use of British steamers coaling abroad; to reduce the export duty to 6d. per ton in the case of small coal; and, finally, to substitute a fixed *ad valorem* duty of 5 per cent., not to exceed 1s. per ton.

The coal export duty has caused no little consternation among Scotch exporters, who declare that the loss to leading firms on the season's contracts will amount to about £10,000 each. It is considered that the new tax will be the means of placing Germany at a great advantage over Scotland in the Baltic trade; and in the same way America will cut out Scotch coal in the West Indies. Shipowners fear that a portion of the duty will come out of their pockets. The Glasgow coal exporters met on 'Change last Friday and protested against the duty.

Mr. Abraham, M.P. ("Mabon"), President of the Welsh Miners' Federation, has expressed extreme surprise and regret that the Government had decided to impose such a heavy burden upon the coal industry as a tax of 1s. a ton on exports. He says the ultimate result of such a tax will in all probability be that scores of South Wales collieries will have to be closed, and thousands of men thrown out of employment. In his opinion, the tax is wrong in principle, and will inevitably cause the overthrow of the Government.

The proposal of the Chancellor of the Exchequer has given rise to a good deal of comment and criticism in the coal trade of the Manchester district. Even, however, if the effects of the suggested tax were to be as serious as the most pessimistic anticipations indicate, they would not fall, to any material extent, upon collieries in that district. Some observations on the situation by our Manchester correspondent will be found in our "Coal Trade Reports."

THE FATALITIES AT THE BRIGHOUSE GAS-WORKS.

The Coroner's Inquests—Another Death.

At the Huddersfield Infirmary, on Monday last week, an inquiry was opened by Mr. P. P. MAITLAND, the Coroner for the West Riding, into the circumstances attending the death of William Owen, carbonizing foreman at the Brighouse Gas-Works, which resulted from injuries caused by the explosion which occurred on the previous Friday afternoon, as reported in the "JOURNAL" last week (p. 1019). Deceased had been only a week in the service of the Corporation. The other injured men, one of whom (Barraclough) had to be removed to the Infirmary with Owen, were at the time progressing fairly well; and it was expected that they would in a week or two be in a condition to give evidence.

Mr. K. H. GARVIE, the Government Inspector of Factories for the Halifax district, was in attendance; and Mr. W. WRIGHT watched the proceedings on behalf of Barraclough.

The inquiry having been formally opened,

Mr. *James Parkinson*, Town Clerk of Brighouse, and Consulting Gas Engineer to the Corporation, was called. He said deceased was an intelligent man, and in his application for the position of carbonizing foreman he stated that he had had experience in charging and discharging inclined retorts, as well as in firing. When witness arrived at the works after the accident, he found deceased, badly burned, lying on the top of the retorts. A flange had been removed, and a tar-plug and the gas-outlet from the hydraulic main were open, and tar and gas were burning.

Witness's inference was that the deceased had thought there was a stoppage of tar near the ascension-pipe, and in order to clear it had removed the flange. No complaint had been made of any defect in the plant prior to the accident; and he could not conceive why the flange had been taken off, or the plug and valve opened.

In reply to Mr. GARVIE, witness said the deceased might have struck the retorts instead of doing what had been done. It would have entailed a waste amounting to about 2 tons of coal, costing 30s.; but this would not have fallen upon the deceased, nor would it have damaged his reputation.

In answer to Mr. WRIGHT, witness said that the principal stoppage occurred, so far as he knew, at the tar-valve. The accident would not have been prevented by opening the lid at the charging end. In the ordinary course, the first thing to be done would be to open the door at the other end. Instructions were not given to the men to this effect, as it was taken for granted that they knew. It was beyond his comprehension why the flange had been taken off. He should as soon have thought of a man drilling a hole in a boiler, and not expecting to be scalded, as of an intelligent man taking off the flange and removing the tar-plug, and not expecting tar to escape and burn him.

The CORONER pointed out that there was no evidence as to what the man did. The inquiry would have to be adjourned, and upon it being resumed, he hoped Thornton and Barraclough would be able to give evidence as to what was done.

Midgley Crowther, the sulphate maker at the works, said he replaced the flange, and could find only two of the set-screws with which it had been fixed. Two new ones had to be obtained.

The inquiry was then adjourned until the 8th prox.

Unfortunately, the hope entertained that Barraclough would be able to attend and give evidence at the adjourned inquiry, proved to have been groundless, as he had a relapse, and succumbed to his injuries on Thursday morning. An inquest was opened the next day by Mr. P. P. Maitland, when the wife of the deceased stated that he had died in her presence. Mr. Parkinson expressed, on behalf of the Corporation, their regret at this further sad result of the accident. The Coroner said they all deeply sympathized with the relatives of the deceased.

PRESENTATION TO MR. SAMUEL STEWART.

Last Wednesday afternoon, at the Corporation Gas Offices, Inchgreen, Greenock, a presentation was made to the late Manager of the gas-works, Mr. Samuel Stewart, by the employees who had served under him, as a mark of their esteem and regard, and in recognition of his services for the long period of thirty-six years in the above-named capacity. The presentation consisted of an easy-chair (with reading-desk attached, standard lamp, and ornamental coal-cabinet. Mr. W. EWING, the present Manager, presided, and he was supported by Mr. and Mrs. Stewart, Bailie Campbell (Convener of the Gas Committee), Mr. M'Kenzie (Collector), and other friends; and there were present representatives of the different departments of the works.

The CHAIRMAN, in opening the proceedings, referred to his own early acquaintance with the Greenock Gas-Works, and with Mr. Stewart, since twenty-eight years ago, when it was decided to leave Crawfurd Street and change to Inchgreen; and no man could have had more pleasure than he had in succeeding such a predecessor as Mr. Stewart. At the time referred to, Mr. Stewart was regarded as one of the first—if not, indeed, as the very first—of the gas engineers of Scotland. He stood so high in his profession that he was deemed worthy to be put forward as Manager of the Glasgow Gas-Works, which position he lost by only one vote. During his long period of service in Greenock, he had conducted the works in a very able manner. They were considered to be model works; but, owing to the enormous increase in the consumption of gas, their productive capacity of 300 million cubic feet had now been passed. They were nevertheless a monument to Mr. Stewart's skill. He concluded by calling upon Bailie Campbell to make the presentation.

Bailie CAMPBELL said he considered it an honour to have been asked to represent the employees, and be their medium in handing over to Mr. Stewart the tokens of esteem and affection which they entertained towards him. That gentleman had for nearly forty years supervised in a most admirable manner the gas undertaking of Greenock, the developments of which he traced; remarking that Mr. Stewart not only showed great engineering skill, but, in carrying out the duty of building the works, proved that he was endowed with something of the prophetic instinct when he stated that after the lapse of thirty years they would be found to have reached their maximum productive capacity. During all this time, he had kept himself thoroughly abreast of the developments and changes that had taken place in gas manufacture, and it must be gratifying to him to know that among his compeers he enjoyed the reputation of being one of the first gas engineers in Scotland.

Mr. STEWART, in reply, thanked the donors not only for their valuable gifts, but for the kindly expressions which had been used towards him. It was particularly gratifying to him to see some present who had been longer in the service than he himself had. The works at Inchgreen, which had always been well spoken off, would require to be added to; and as his health was failing, he found it necessary to retire. Under Mr. Ewing's management, however, he had no doubt the works would be as great a success in the future as they had been in the past.

A number of toasts were proposed, and a vote of thanks to the Chairman terminated the proceedings.

Coal-Fields in Canada.—According to a Central News telegram from Ottawa, Mr. M'Evoy, the Canadian geologist, who has been employed by the Dominion Government to survey the coalfields in the Crow's Nest Pass, reports that they contain 22,000,000,000 tons of marketable coal.

THE CALORIFIC VALUE OF CARBURETTED WATER GAS.

The Editor of a provincial newspaper has necessarily to write on many and varied subjects, and therefore it is only natural for him to go a little astray on some of them. The liability to err which is acknowledged to be human is specially great in connection with matters of science, and particularly with the branch of it which is connected with gas making. The Horsham Gas Company, as our readers are aware, have embarked upon the manufacture of carburetted water gas; and at the recent inquiry by the Board of Trade into the Company's application for additional powers, their Counsel (the Hon. Alfred Lyttelton) laid stress upon the fact that the production of this gas was more economical than that of ordinary coal gas, and that therefore the consumers would be likely to benefit from its introduction by a reduction in price. Commenting upon this statement, the Editor of a local paper remarked: "That the local price of gas cannot consistently maintain its late fivepenny upward bounds against such a formidable rival as the electric light, when owned by the ratepayers themselves, and run on popular lines, there can be no doubt. Not that the introduction of electricity must necessarily ring the death-knell of gas consumption, but that the Gas Company is deliberately discouraging the use of gas for all cooking and heating purposes by prohibitive price and admixture of water gas—which last is utterly valueless, we understand, for other than lighting purposes—and so closing a most valuable market for its product."

It was not likely that this comment would escape the eye of Mr. E. D. Sapey, the Company's Manager and Secretary; and he pointed out to its author that it was entirely without foundation. He very prudently did not attempt to show him where he had gone wrong, being fully conscious of the truth of the sacred dictum that "a prophet is not without honour save in his own country and among his own people," but sent the comment to Mr. W. J. A. Butterfield (who had given evidence at the inquiry), whose knowledge, as a Consulting Chemist, of the chemical and calorific properties of carburetted water gas would, he said, more readily convince him of the fallacy of his criticisms than any statement emanating from an official of the Company. Mr. Butterfield wrote—and Mr. Sapey sent his letter to the paper—that the Editor was, of course, entirely wrong in his contentions, which showed the danger of possessing a little knowledge of a subject. He then went on to explain that "even simple water gas is not valueless for heating purposes, otherwise it would not be employed on a large scale for heating in many industrial operations. Further, carburetted water gas, especially if of high candle power, is a most valuable heating gas; and, in virtue of the proportion of carburetted water gas which it contains, the gas now supplied to Horsham is a very high-grade heating gas." He appended a statement of the relative values, for various uses, of coal gas such as was formerly supplied to Horsham, and of the mixture of coal gas and carburetted water gas now sent out. The values given were deduced from the results of analyses of two samples of gas taken by Mr. Butterfield (without previous warning to the Company) last month—one being gas drawn from a tap in a consumer's premises in the town, and the other simple coal gas from the works. The latter had an illuminating power of about 14 candles, and a heating value of 158 calories per cubic foot; the mixture of coal gas and carburetted water gas, as supplied in the town, an illuminating power of about 20 candles, and a heating value of 185½ calories. As the result of his investigations, he found that the Company are "now engaged in supplying gas which is greatly superior to the article demanded by statute—*i.e.*, 14-candle power gas—in that, for lighting in argand and flat-flame burners, it has 43 per cent. greater value; for lighting in incandescent burners, about 50 per cent. greater value; and for heating and cooking purposes, 17½ per cent. greater value. Moreover, the gas now supplied contains not much more than half the quantity of sulphur (whence arise objectionable products when the gas is burnt) which would be present in the statutory article." The two letters were not only inserted, but were accompanied by an expression of the Editor's pleasure in according them publication. He remarked that his waste-paper basket would require less frequent emptyings if all his correspondents confined themselves to stating that he was "entirely wrong" in his "contentions," and setting out statistics, with the authority of their own names, to prove that they were entirely right. His defence, offered "with all appropriate humility," was that, writing on the eve of Good Friday, he availed himself of the only authority readily at hand—the writer of the article on "Gas" in the latest edition of the "Encyclopædia Britannica," who states therein as follows: "Water gas has been proposed, not only as an illuminating agent, but at least as much as a source of heat; but the heat expended in the decomposition of water is much greater than can in practice be given out by the resulting gases." The article in question has evidently not been brought close up to date. The Editor acknowledged that it must be assumed, from Mr. Butterfield's figures, that "carburetted water gas is valuable as a cooking gas; and that when mixed with coal gas, as supplied by the Horsham Gas Company, at 4s. 7d. per 1000 feet, it is 17½ per cent. better value for heating, and from 43 to 50 per cent. for lighting purposes, than the minimum quality allowed by law, and irrespective of price."

THE SUPPLY OF WATER GAS IN LIVERPOOL.

At the Meeting of the Liverpool City Council last Wednesday, the minutes presented by the Electric Power and Lighting Committee contained an important report by the City Lighting Engineer (Mr. C. R. Bellamy) on the subject of the supply of carburetted water gas. It was briefly referred to in the "JOURNAL" for the 2nd inst. (p. 906).

In view of two deaths which had occurred in Liverpool, he was in June last verbally instructed to obtain a series of analyses of the gas supplied to the city; and these were made by Dr. C. A. Kohn, of University College, Liverpool, during the months of November and December, when the consumption is the heaviest in the year. He took

30 samples at 14 different points, mostly between 9 p.m. and 9 a.m.; the localities from which they were procured being grouped into three districts. In district No. 1, the percentage of carbonic oxide found in the samples varied from 6·9 to 10·8; and the approximate proportion of carburetted water gas ranged from 3 to 16 and 18 per cent. The evening supply to this district contained the largest proportion of carburetted water gas, except in one case; but in no instance did the quantity of carbonic oxide reach the 12 per cent. limit of the Departmental Committee on Water Gas. In district No. 2, the approximate proportion of carburetted water gas was 39, 41, 45, and 47 per cent.; and gas containing an average of 17 per cent. of carbonic oxide was supplied during the night. In district No. 3, there was additional evening pressure, largely due to carburetted water gas, which in one street reached 25 per cent., with 12·4 per cent. of carbonic oxide; and in another 43 per cent., with 17·1 per cent. of carbonic oxide. The latter sample was taken in the house where one of the fatalities occurred. In two other streets the percentages were, in both instances, less than half of those quoted above. The conclusions arrived at by Dr. Kohn were that "the present conditions of supply in districts Nos. 1 and 3 may be regarded as satisfactory; but, bearing in mind the fact that the danger from an escape of gas increases at a much greater ratio than the percentage of carbonic oxide, the admixture supplied to district No. 2, especially during the night, is unnecessarily poisonous." The results of these analyses were submitted by Mr. Bellamy to the Electric Power and Lighting Committee on the 8th ult.; and in the report which he then presented he made the following remarks: "At an inquiry held in March, 1898, on the body of a man whose death was certified to be due to carbonic oxide poisoning in Great George Square, Mr. King, the Gas Company's Engineer, stated that his instructions were that coal gas was to be supplied during the night. And again at the inquest held in November on the body of a man whose death was certified to be due to coal-gas poisoning, the Assistant Gas Engineer, Mr. Allen, stated that coal gas only was supplied from 11 p.m. to 6 a.m. in that district. In view of these statements, it is disappointing to find that so large a percentage of water gas—practically 50 per cent.—is being sent out during the night to a portion of the south end of the city. In addition to the recommendation of the Departmental Committee—viz., that the proportion of carbonic oxide in the public gas supply at night should be limited to 12 per cent.—it was also recommended 'that, before any kind of water gas is distributed in any place, due public notice of the proposal should be required to be given; and that as long as there is any water gas in a gas supply, that fact should be stated on every demand-note.' The recommendations of the Departmental Committee have not been embodied in a Bill, and are not therefore in force, but gas authorities might reasonably be expected to be guided in some degree by them; and the Engineer would recommend that the Town Clerk be requested to bring the matter under the notice of the Gas Company." This was accordingly done; and the reply of the Secretary (Mr. P. F. Garnett, J.P.) was that the Directors had "no desire to make any observations on the report." In a post-script to the Town Clerk, the Secretary said: "You are doubtless aware of the correspondence on the above subject which passed between your predecessor and myself in the years 1898-9."

Mr. Higginbottom, M.P., in moving the confirmation of the proceedings of the Committee, said they had carefully considered the subject dealt with in the report, which they viewed with alarm. He was prepared to move a resolution on the matter; but he was informed by the Town Clerk that, in order to be in a position to do so, he must ask the Council to refer the report back to the Committee, who would do their utmost to protect the lives and pockets of the community. The matter was most serious. District No. 2 was supplied with a mixed gas including 44½ per cent. of water gas, containing upwards of 17 per cent. of carbonic oxide. In other districts the percentages were not so high; but the matter required careful consideration. Under the circumstances, he asked leave to take back the report, and bring forward at the next meeting of the Council a recommendation dealing with the question. Mr. R. D. Holt commended the course proposed by the Chairman. The report was of an alarming character. The supply of water gas must be brought, in some way, under public and responsible control. Mr. Austin Taylor was strongly in favour of legislation for securing for the city a supply of pure gas. He urged that it was distinctly within the rights of the Council to approach the Imperial authorities on the matter. Alderman Paull wished to know from the Town Clerk if the Council had power to prohibit the distribution of this gas, or if they had to trust entirely to persuasion. If the latter, then their position was most perilous. It was not a report they wanted, but definite action by the Council to obtain new powers. Alderman Petrie said the Chairman of the Lighting Committee was a Member of Parliament, and he thought he had an opportunity of making his mark in the House of Commons by introducing a Bill to deal with the subject. To have 47 per cent. of water gas in one of the southern districts of the city, could only be described as monstrous. It was then agreed to refer the report back to the Committee.

ELECTRIC LIGHTING NOTES.

Failure has attended the efforts of the Chatham Corporation to conclude an arrangement for the purchase of the local Electric Lighting Company's undertaking. The Corporation offered £20,000; but the Company refuse to accept less than £35,000.

Referring to an application by the Wolverhampton Town Council for permission to borrow £58,942 for electric supply purposes, the Local Government Board have decided to comply with the application; but at the same time they state "that no payment must be made out of the loan to any salaried official of the Town Council," except in the case of payments, if any, due to the Town Clerk for legal work not within his ordinary duties under the terms of his appointment.

The Electricity Committee of the Manchester Corporation met last Wednesday, and adopted an estimate of income and expenditure for the next financial year. Instead of a surplus, the Committee anticipate a deficit of £5000. The loss is attributed to the fact that during the past year cables were laid far beyond the Committee's ability to supply current. They have a reserve fund of £13,000, and it is expected that they will draw upon it to cover next year's deficiency.

The scheme of electric lighting planned by the Town Surveyor of Malvern (Mr. H. P. Maybury), in whom readers will also recognize the Gas Engineer, to which reference was made in last week's "Notes," has found favour with the ratepayers. Last year the ratepayers rejected a scheme which was to cost £30,000, and only proposed the lighting of the centre of the town. Mr. Maybury's project will cost £17,000, will cover the district, and dispose of the refuse.

On Tuesday Colonel W. Langton Coke, an Inspector of the Local Government Board, held an inquiry at Walsall, relative to an application by the Town Council for sanction to borrow £3000 for the purposes of the electric lighting undertaking. The Town Clerk explained that an extension of the plant had become necessary owing to the increased demand for current, particularly in the centre of the town, where it was proposed to fit up a new transformer sub-station.

Last Friday, Mr. H. H. Law, an Inspector of the Local Government Board, held an inquiry at Barnsley into the application of the Corporation for sanction to borrow £20,000 for the extension of the electric lighting works. Mr. Bastow explained that the electricity installation was opened about a year ago; the first capital being £25,000. Temporary plant, costing £3500, was added; and the growth of the demand was such that it was very necessary that the station should be enlarged to meet the requirements of the town.

Mr. H. H. Law, on behalf of the Local Government Board, conducted an inquiry last Thursday, at the Leeds Town Hall, relative to a proposal by the Corporation to borrow £510,500 under the Public Health Act, 1875, and the Electric Lighting Act, 1882. There was no opposition. The Town Clerk (Mr. W. J. Jeeves) said the history of the electric light undertaking since it was acquired by the Corporation had been one of continuous progress. From 1893 the revenue had grown from £4001 to £43,624; while the working expenses had gone up from £2706 to £13,770. During the past year, owing almost entirely to the greater cost of coal, the expenses had augmented more than 25 per cent.; but the profits, amounting to £29,884, showed an increase of £3600 upon the previous year. Of the amount of the proposed loan, it was stated that about £160,000 was required for new buildings and plant. A sum of £141,929 had been spent upon the existing works, having been provided by the bank; and the remainder was required for new mains and other purposes. In 1893, the number of units sold was 130,000; last year it reached 2,520,414 units.

A Local Government Board inquiry was held at Kendal last Wednesday, by Mr. M. K. North, into the application of the Corporation for leave to borrow £14,000 for the purposes of supplying electricity to the town. The Town Clerk (Mr. Bolton) explained that the Corporation desired to extend the repayment of the loan over thirty years. The money was made up as follows: For buildings, £3000; for equipment of station, £4975; for the supply of underground mains, meters, &c., £2965; for cost of Provisional Order, engineers' fees, and expenses, £1000; contingencies and extensions, £2060. In 1895, 508 letters were sent out to burgesses, inquiring what demand there was for electricity in the borough; and the result was to show that the probable number of lights required would be 590. From time to time there was evidence of demand; and in July, 1899, a further inquiry was made. On that occasion 1273 letters were sent out. The compulsory area indicated in that application was slightly larger than the one now adopted, but there were then demands for 1895 8-candle lights.

Colonel W. L. Coke held an inquiry last Wednesday, on behalf of the Local Government Board, at the Burton-on-Trent Town Hall, in regard to an application for a loan of £5000 for electric light extension works. Messrs. T. N. Whitehead (Town Clerk) and F. L. Ramsden (Gas and Electrical Engineer) represented the Corporation. Mr. Whitehead explained that the assessable rateable value of the borough was £277,258. The electric light works were commenced in 1893, and the supply was first given to the consumers on Feb. 26, 1894. Mains had been laid in the streets extending over 7000 yards. In the first year there were 53 consumers, and the loss out of the rates was £1802. This had gradually decreased, until last year it was only £5 9s. 6d. It had been decided by the Corporation to fix new machinery in the space at present occupied by a small set, by which the generating power would be more than doubled, without necessitating any addition or extension to the building. The Corporation originally charged the consumers an all-round price of 6d. per unit for lighting purposes; but in 1898 this was altered to the Brighton system—viz., 6d. per unit for the first 1½ hours' maximum demand, and 3d. per unit afterwards. By this alteration the average price per unit for lighting had been reduced to a fraction over 5d.

An inquiry was held at Alfreton last Wednesday, by Mr. A. P. Trotter, into an application of the District Council to the Board of Trade for an Electric Lighting Order. It was stated that the price of gas was in 1899 raised from 3s. 9d. to 4s. 3d. per 1000 cubic feet. The Council proposed to purchase the gas-works, but the price demanded was deemed too high. They tested the feeling of the town on electric lighting; and out of 751 persons canvassed, 181 signified an intention to take the light, 106 were in favour of the light, 380 papers were not filled in, and 56 were against the proposal. Mr. W. W. Nelson, the Clerk to the Council, gave statistics relating to the rateable value, borrowing powers, &c., and said that, with the exception of the gas interest, the Council were unanimously in favour of electric lighting. The amount applied for was £13,780. Mr. C. A. Baker estimated the cost of the scheme at £13,734, the yearly maintenance charges at £1498 5s. 10d., and the probable revenue at £1500. Mr. J. S. Barnes (the Council's Engineer) also explained the details of the scheme. In opposition, Mr. A. A. Campbell Swinton said he thought the expense of the scheme was under-estimated and the revenue over-estimated. There would, he thought, be a deficit of £614. He said he did not know whether the great power companies would charge a low price of 3d. per unit after or before reducing the power. This point was considered by the Inspector as very important.

The Barmouth Gas Company have accepted the tender of Messrs. R. Dempster and Sons, Limited, of Elland, for a new retort-bench and general alterations to the works.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The great event of the week has been the imposition of an export duty on coal. I cannot help thinking that the duty will be withdrawn. There are so many interests connected with the coal trade outside the United Kingdom, that it is scarcely open to our Legislature to spring a tax upon it without warning. If the tax should be a success, the money will come, not out of the foreigner, but out of the home consumer; and coal will be dearer. This is the most that the Chancellor of the Exchequer can hope for; and so it will not be much benefit to the country. The reverse of the subject is that, if the tax should be a failure—that is, if it should drive away the foreign demand—coal would accumulate at home, and would become cheap. But this would be a worse state than the other, because it would mean that the shipping trade, upon which this country depends so much, would be completely disorganized. Customs duties would go down everywhere. The situation, in effect, would be that the Government would retain the sprat of the coal tax, but would lose the herring of the customs dues. It may be advisable that some check should be put upon the export of coal; as to that, I give no opinion here. But if such steps be taken, they should only be adopted after due warning.

The Corporation of Falkirk this week had read to them letters by the Railway Companies as to the provision of railway accommodation at the new gas-works. The Companies have a working agreement, to the effect that the one shall not construct competitive works without the sanction of the other; and it is in the adjustment of the railway provision so as to please both Companies, that the delay is taking place. Mr. Russell, the Convener of the Works Committee, said that, whatever the Companies were considering, it was neither the interests of the gas undertaking nor the commercial interests of the town. He thought that, not only was the gas undertaking being made to suffer under the private agreement, but that, to the knowledge of some of the members of the Council, some of the largest commercial enterprises in the town were suffering seriously. He thought they ought to step in and press matters a little further than hitherto; otherwise the question might drift on for years, as it had been doing. The Council resolved to hold a special meeting to consider the subject. The Works Committee recommended that the Manager be instructed to secure tenders for the supply of coal for next year. Upon this there was some discussion, as the outcome of which the Council resolved, by a majority, that the Town Clerk is to advertise for tenders and receive them. The tenders are to be opened by the Convener; but all information is to be furnished by the Manager. It seems that hitherto the Manager has advertised for, and taken in, tenders. The new arrangement, I venture to say, is the more satisfactory one. There is no reflection upon any person or system in making the changes, but simply a desire to perfect the working arrangements. The Manager must state his requirements; and when the tenders come in, it is upon his advice that the different articles must be selected. But the Town Clerk is the legal adviser to the Corporation; and it devolves upon him to see that the tenders and acceptances are in proper form. It is not infrequently necessary to apply pressure in order to secure the due fulfilment of contracts; and unless everything is made sufficiently firm when a contract is entered into, it might be impossible to secure fulfilment, the result of which would be a loss to the undertaking.

There is a movement in Newport (Fifeshire) for the transfer of the gas undertaking to the Corporation, concurrent with a proposal to erect new gas-works. This week the Town Council held their second special meeting to consider as to the adoption of the Burghs Gas Supply Acts; and at it there was submitted a report upon the works by Mr. James M'Gilchrist, of Dumbarton, who had been employed to examine them. Mr. M'Gilchrist reported that the Company's Secretary and Manager had kindly given him all the information he desired, and that, after due consideration, he was of opinion that the value of the undertaking, as a going concern, was £10,072. This amount did not include accounts due by consumers, cash balances, deposit receipts, shares of the Gas Company held by the Directors of the Company, stocks of gas, coal, lime, coke, tar, or ammoniacal liquor, or new meters in stock; but it embraced all pipes, lamps, and loose and fixed tools (whether in use or in stock) of every description—the Town Council to take over the Gas Company's contracts at contract prices, and also (at a valuation) consumers' gas accounts in arrear, and to pay all expense connected with the valuation and the cost of the transfer. In his opinion, the works are far from being "up-to-date." In all his experience, he never had to value works so "cramped." The site is altogether too small. To re-model the works would be simply to throw money away. Every inch of the ground is occupied; the station meter, for want of ground space, being fixed "upstairs." For a like reason, the coke and ashes heaps lie outside the works. The coal-store is outside the works gate, or rather retort-house door, for there is no gate. In a word, the works are altogether unsuitable for their requirements. The purifiers (with a dangerous tar-tank underneath), lime storage, station meter, governor, gasholders, photometer, &c., are insufficient for present requirements, and could not be economically utilized in new works. The works are not equipped with an exhauster. The management deserve great credit for the feat of manufacturing a sufficient quantity of gas in winter to keep the burgh from being plunged in darkness. The new site which has been selected by the Company is ample—1½ acres—and well adapted for the economical production of coal gas. He carefully examined the main pipes in various parts of the burgh, and, with one or two exceptions, found them in fair condition. Several, however, are too small. The purchase by the Council would stop the Gas Company's practice of charging on the price of gas, in addition to the dividend, the cost of extending their undertaking. The purchase would also result in the immediate removal of the works to a site outside, but still within easy reach of, the burgh. The Council agreed to formally offer the sum of £10,072, as recommended by Mr. M'Gilchrist; and, in view of the negotiations with the Company, the meeting was adjourned till the end of May.

It has been announced to-day that, owing to the dissatisfaction of the people in Largs with the price and quality of the gas supplied by the Company, negotiations are in progress for the formation of a new Gas Company. The proposal is to erect a works capable of producing 5 million cubic feet of gas annually, at a cost of about £4000, and to form a Company with a capital of £4500 in £1 shares; the shares to be offered, in the first place, to consumers. I may say that the present Company have a capital of £5380, and an annual output of about 13 million cubic feet. The price is 4s. 7d. per 1000 cubic feet. There does not seem to be much room for enterprise here; and the proposal has, consequently, the appearance of being a sort of kite-flying movement on the part of some discontented ones, of whom there are plenty and to spare everywhere.

The advocates of municipalization carried to an extreme, sometimes raise strange subjects. One of these—a stock question with them—is that a hardship is inflicted upon the poor ratepayer in his being required to pay all his taxes and rates during a period of the year embraced within the winter months. They want the collections spread over the year. It was with a view to giving relief to the (supposed) oppressed citizen, that at this week's meeting of the Glasgow Town Council Mr. Scott moved—"That it be remitted to a Special Committee, consisting of representatives of the Police Finance, the Gas, and the Water Committees of the Corporation, to consider and report upon the desirability of making arrangements whereby the rates and assessments imposed or collected by the Police, Gas, and Water Departments be intimated to, and collected from, the ratepayers under one notice issued by one set of officials, instead of being issued and collected, as at present, by three special sets of officials." He said that from an economic point of view, both as regards time and money, it was desirable that the three departments named should be amalgamated. It would be advantageous to the Council, and a great boon to the public. If this were done, one paper would suffice for the three rates; and it could be issued three times a year—one for six months, and two for the remaining six months. After a discussion, Treasurer Murray moved—"That it be remitted to a Special Committee to consider and report whether any, and if so what, improvement can be made upon the present mode of levying and collecting the several municipal and police rates and assessments, including gas, water, and electricity." This became the finding of the Council. Of course, the improvement which would be most welcomed would be the entire abolition of all assessments. It is a belief in America that the city of Glasgow is in that happy position. It is not yet so, however; and until that time may arrive, the citizens must pay the assessments which the Corporation impose, and they must also pay for the services which they receive from the Corporation. The charges for gas and electricity are made upon the quantity consumed; and it is difficult to see how they could be taken along with the police and water rates. The difficulty would not be in formulating a scheme, but in the working of it. There would be constant friction between the departments, and numerous hardships in the enforcement of the cast-iron rules which would be necessary; and it is a question whether those who at present find it a burden to pay, would not have their burden increased rather than diminished by concentration. I think there can be little doubt that, however the community might fare, the departments would suffer, because individual collectors take a pride in their departments, and strive for their efficiency—a state of matters which would, to a large extent, vanish under a generalized scheme.

The Notkin Syndicate, who are proprietors of the patents under which the process known as the æro gas fountain has been worked, are forming a limited liability Company, who are to acquire the sole rights to the system in Scotland. It is a wonderfully simple and efficient process. By its means, there is no reason why the humblest cottage in the land should not be lighted by gas, as well as the palace of the rich man. A box and a few yards of piping constitute a complete gas-works. The making of gas begins when the tap is turned on, and ceases when it is turned off. Nothing else requires to be done, except to renew the supply of oil in the box. As I explained about a year ago, the gas is heavier than the atmosphere; and if any escapes it falls to the ground, instead of mixing with the air and forming an explosive compound. The only danger with Notkin gas is that it would burn fiercely; but in this respect it is no worse than any other gas. The gas is more suitable than oil for motor purposes, as there is no sediment to be thrown out at intervals, as with oil-engines.

When referring to the productive capacity of the new gas-works at Peebles last week, it should have been mentioned that it was annual, not daily.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *April* 20.

Sulphate of Ammonia.—Still further depression at all points is the record of the week; the closing quotations being £10 to £10 2s. 6d. per ton, delivered f.o.b. at the ports. The anxiety of the Scotch makers, and of some of the London makers, to realize has encouraged speculators in their "bear" operations, and below the equivalent of £10 f.o.b. is being freely quoted abroad. The home demand continues to be fairly satisfactory, and is absorbing a large portion of the now shrinking smaller makes. There is good inquiry in the forward position; but buyers' ideas are scarcely above spot prices, and makers do not find these figures sufficiently good to induce them to operate. Any orders placed are therefore being taken speculatively.

Nitrate of Soda is, owing to arrivals, easier on spot; the quotations being 8s. 4½d. and 8s. 6d. per cwt. for ordinary and refined qualities respectively.

LONDON, *April* 20.

Tar Products.—The markets are quiet all round; and there is very little doing. Benzol is quiet; and it is really almost impossible to fix an average value. A little business is reported in 90 per cent. at 8d. and 8½d. per gallon into buyer's packages at maker's works; but for export there is no business to report. Makers do not appear to be offering any quantity; but dealers have lately accepted low prices for early delivery, probably to clear out purchases made earlier at better prices. Pitch is weaker; but makers are well covered for the season. Tar oils are better, more especially as regards London, where there is a decided improvement in value. Crude carbolic keeps steady. There is a fair

business doing in 60's at 2s. 6d. per gallon, while the market for crystals is slightly firmer. Salts are very quiet; but there are not wanting indications that consumers are prepared to purchase to cover their requirements over the summer months. As regards tar, several large contracts have recently been let on the sliding-scale; but the value generally is lower all round.

The average values obtaining during the week are: Tar, 14s. to 17s. 6d. Pitch, east coast, 30s.; west coast, 27s. 6d. Benzol, 90's, 8d. to 9¼d.; 50's, 8d. to 9d. Toluol, 1s. Crude naphtha, 4d. Solvent naphtha, 1s. 1d. Heavy naphtha, 1s. Creosote, 1¼d. Heavy oils, 2d. Carbolic acid, 60's, 2s. 6d. Naphthalene, 90s.; salts, 60s. Anthracene, "A," 3d.; "B," 2d. (nominal).

Sulphate of Ammonia.—The demand for home consumption appears to have ceased; and as regards export, there is very little doing. The Gaslight and Coke Company have accepted £10 for the usual Beckton make; but for some time past this has been the real value in the open market. As regards Leith, a small business is reported at £9 17s. 6d.; but, as a rule, the makers hold for £10. There is nothing of importance doing at Hull. A small sale is reported at £9 18s. 9d. for immediate shipment.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—Although the inclusion in the Budget proposals of an export duty of 1s. per ton on coal has not come as a surprise, it is nevertheless creating the greatest excitement in the coal trade, and will undoubtedly meet with the most strenuous opposition on the part of both coalowners and shippers. From a consumer's point of view, however, the imposition of an export duty on coal will probably be regarded rather favourably than otherwise. In normal times, the shipping trade has afforded a very convenient outlet to coalowners for getting rid of their surplus supplies, and enabling them to keep up their inland prices. When stocks have been accumulating in waggons, it has been customary for coalowners favourably situated for the shipping trade to send these away to the ports for prompt clearance sale at figures very much below those quoted at the pit for inland trade. As these low-cut figures do not become generally known on the market, they have not appreciably disturbed the inland prices; so that colliery owners have frequently been charging to inland consumers a couple of shillings per ton more than they have been taking for coal sent away for export, of which the foreign consumer reaps the full benefit. Even under existing conditions, when there is an actual scarcity in the better qualities of round coal, and no very excessive surplus in the lower descriptions, orders are being taken by Lancashire collieries at below the prices that are quoted to inland consumers. The imposition of an export duty of 1s. per ton will necessarily tend somewhat to restrict this pushing of supplies for shipment at low figures, to the detriment of inland consumers, and bring more coal upon the inland markets, with the result that these extra supplies will give an easier tone to prices. The duty will not so much affect the better qualities of round coal as the lower descriptions, used for steam, forge, and general manufacturing purposes; and it will no doubt also influence the price of gas coal. But it is, of course, as yet too early to form any definite conclusions as to the effect of the duty, supposing it is finally adopted by Parliament. With regard to the condition of trade generally, throughout the district the better qualities of round coal continue very scarce, and are fully maintaining their price, with little or no probability at present of any appreciable reduction with the close of the month, or possibly any very material giving way during the summer. At the pit prices remain firm at about 16s. to 17s. per ton for best Wigan Arley, 14s. 6d. to 15s. for Pemberton four-feet and seconds Arley, and 13s. to 14s. for common house coal. In the lower qualities of round coal, the inland demand continues only moderate for steam and forge requirements; but with no very great pressure of surplus supplies, prices are fairly steady at from about 11s. to 11s. 6d. per ton at the pit for good ordinary qualities, though less than this had been taken for shipping orders. As to gas coal, nothing definite has yet passed through in the way of actual transactions on renewal contracts to afford any test of prices. A meeting of Lancashire colliery owners raising gas coals was held last week; but this appears to have been more with a view of apportioning among themselves the probable contracts for the ensuing season, than of actually deciding upon any definite basis for prices. At the meeting, it may be added, there were representatives of collieries which last season contracted for nearly 900,000 tons of gas coal; and the main object, as already stated, was to arrange how the contracts should be divided among them this year, so as to avoid unnecessary competition. As it is now definitely admitted by the Yorkshire coalowners that they have settled for the bulk of the ensuing six months' contracts with the railway companies, on the basis of 9s. per ton at the pit for Yorkshire hards, the position of Lancashire collieries becomes one of very great difficulty. Generally, Lancashire coalowners are asserting that they will not entertain contracts with the railway companies at anything under 10s. per ton; but as the relative value of Lancashire locomotive fuel is below that of Yorkshire, it is very doubtful how far such a reversal of their respective positions can be maintained. When the tenders are sent out for the railway locomotive fuel contracts, there will undoubtedly be one of the keenest possible contests between the coalowners and the railway companies. Supplies of engine fuel continue plentiful, with a gradual easing in prices. Lancashire coals are, however, fairly steady at late rates, the commoner qualities of slack averaging 7s. to 7s. 6d. per ton at the pit, and better qualities 8s. 6d. to 9s.; but good slack can be bought from Derbyshire at about 5s., and from Yorkshire and Staffordshire at 6s. to 6s. 6d. For shipment, there is only a moderate inquiry; and 12s. to 12s. 6d. represents about the full average prices for good qualities of steam coal, delivered at the Mersey ports.

Northern Coal Trade.—There has been considerable activity in the steam and gas coal trade; and prices have been firmer. In steam coal, the opening of the Baltic is giving briskness to the collieries; and prices have been high in comparison with what they were a month ago.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 1051.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.	GAS COMPANIES.			£ s. d.
590,000	10	Apl. 12	10½	Alliance & Dublin 10 p.c.	19—20*	..	5 5 0
100,000	10	,,	7½	Do. 7 p.c.	13—14*	..	5 7 2
300,000	100	Jan. 2	5	Australian 5 p.c. Deb. .	99—101	..	4 19 0
200,000	5	Nov. 14	6	Bombay, Ltd. . . .	6—6⅜	..	4 12 4
40,000	5	,,	6	Do. New, £4 paid	4¼—4⅜	..	5 6 8
380,000	Stk.	Feb. 14	12	Brentford Consolidated	260—265	..	4 10 7
270,000	,,	,,	9	Do. New . . .	187—192	..	4 13 9
50,000	,,	,,	5	Do. 5 p.c. Pref. .	128—132	..	3 15 9
159,375	,,	Dec. 13	4	Do. 4 p.c. Deb. .	113—116	..	3 9 0
220,000	Stk.	Mar. 14	10	Brighton & Hove Orig.	222—227	..	4 8 1
226,320	,,	,,	7	Do. A. Ord. Stk. .	160—165	..	4 4 10
1,022,500	Stk.	Feb. 27	5	Bristol, 5 p.c. max. .	121—123	..	4 1 4
420,000	20	Mar. 28	10	British.	40—41*	..	4 17 7
50,000	10	Feb. 28	12	Bromley, Ord. 10 p.c. .	24—26	..	4 12 4
79,000	10	,,	9	Do. 7 p.c. . . .	19—21	..	4 5 8
500,000	10	Oct. 12	6	Buenos Ayres (New) Ltd.	9—10	..	6 0 0
220,000	Stk.	Dec. 28	4	Do. 4 p.c. Deb.	97—100	..	4 0 0
150,000	20	Mar. 14	8½	Cagliari, Ltd. . . .	22—24	..	6 17 6
100,000	10	Sept. 28	8	Cape Town & Dis., Ltd.	14½—15½	..	5 3 3
50,000	50	Nov. 2	6	Do. 6 p.c. 1st Mort.	53—55	..	5 9 1
550,000	Stk.	Apl. 12	12	Commercial Old Stock	275—280*	..	4 5 9
236,425	,,	,,	9	Do. New do. .	205—210*	−2	4 5 9
238,237	,,	Dec. 13	4½	Do. 4½ p.c. Deb.	130—135	..	3 6 8
800,000	Stk.	Dec. 13	9	Continental Union, Ltd.	165—170	..	5 5 11
200,000	,,	,,	7	Do. 7 p.c. Pref.	163—168	..	4 3 4
575,000	Stk.	Feb. 28	5	Crystal Palace Ord. 5 p.c.	115—120	..	4 2 0
60,000	,,	,,	5	Do. 5 p.c. Pref.	127—132	..	3 14 1
486,030	10	Jan. 31	11	European, Ltd. . . .	20—21	..	5 4 9
354,060	10	,,	11	Do. £7 10s. paid	14½—15½	..	5 6 5
15,079,885	Stk.	Feb. 14	4 1/16	Gas-light and Coke { 4 p.c. Ord. . .	92—95	−1	4 12 7
2,600,000	,,	,,	3½	{ 3½ p.c. max. .	89—92	..	3 16 1
3,799,735	,,	,,	4	{ 4 p.c. Con. Pref.	110—113	+1	3 10 10
4,063,425	,,	Dec. 13	3	{ 3 p.c. Con. Deb.	93—95	..	3 3 10
70,000	10	Oct. 26	8	Hongkong & China, Ltd.	13⅝—14⅝	..	5 10 4
3,800,000	Stk.	Nov. 14	10	Imperial Continental .	212—217	+2	4 12 2
473,600	Stk.	Feb. 14	3½	Do. 3½ p.c. Deb. Red.	100—102	..	3 8 8
561,000	Stk.	Feb. 28	10	Liverpool United A .	234—236	..	4 4 9
678,100	,,	,,	7	Do. do. B .	170—173	..	4 0 11
306,083	,,	Dec. 28	4	Do. do. Deb. Stk.	120—122	..	3 5 7
75,000	5	Dec. 13	6	Malta & Medn., Ltd. .	4⅜—5¼	..	5 14 3
560,000	100	Apl. 1	5	Met. of { 5 p.c. Deb.	104—107	..	4 13 5
250,000	100	,,	4½	Melbourne { 4½ p.c. Deb.	102—104	..	4 6 6
541,920	20	Nov. 14	3½	Monte Video, Ltd. . .	9⅜—10⅜	..	6 13 4
717,946	Stk.	Feb. 22	8½	Newc'tle & G'tesh'd Con.	225—227	..	3 14 11
312,855	Stk.	Dec. 28	3½	Do. 3½ p.c. Deb.	101—102	..	3 8 8
150,000	5	Nov. 29	8	Oriental, Ltd. . . .	7—7⅜	..	5 6 8
135,000	5	,,	8	Do. New, £4 10s. pd.	6—6⅛	..	5 10 9
15,000	5	,,	8	Do. do. 1879, £1 pd.	1⅛—1⅜	..	4 11 5
					*Ex. div.		

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.	GAS COMPANIES.			£ s. d.
60,000	5	Feb. 28	7	Ottoman, Ltd. . . .	5⅜—6¼	..	5 12 0
851,070	10	Oct. 12	7	River Plate Ord. . .	10¾—11¼	..	6 4 5
250,000	Stk.	Dec. 28	4	Do. 4 p.c. Deb..	97—99	..	4 0 10
250,000	10	Mar. 28	8	San Paulo, Ltd.. . .	11—12	..	6 13 4
135,000	Stk.	Mar. 14	10	Sheffield A	235—240	..	4 3 4
209,984	,,	,,	10	Do. B	234—236	..	4 4 9
523,498	,,	,,	10	Do. C	234—236	..	4 4 9
5,761,885	Stk.	Feb. 14	5	South Met., 4 p.c. Ord.	126—129	..	3 17 6
1,547,965	,,	Jan. 16	3	Do. 3 p.c. Deb. . .	93—96	..	3 2 6
380,940	Stk.	Nov. 14	5	Southampton Ord. . .	108—113	..	4 8 6
70,825	,,	Jan. 16	4	Do. 4 p.c. Deb.	105—110	..	3 12 9
120,000	Stk.	Feb. 28	6	Tottenham and Edmonton { A. 5 p.c.	112—117	..	5 1 8
250,520	,,	,,	4½	{ B. 3½ p.c.	84—89	..	5 0 0
80,100	,,	Dec. 13	4	{ 4 p.c. Deb.	109—114	..	3 10 2
182,380	10	Jan. 16	5	Tuscan, Ltd.. . . .	8—9	..	5 11 1
149,900	10	Jan. 2	5	Do. 5 p.c. Deb. Red.	97—102	..	4 18 0
230,000	5	Feb. 28	9	West Ham, 10 p.c. . .	9—10	..	4 10 0
147,000	10	,,	6	Do. 7 p.c. . .	11½—12½	..	4 16 0
128,984	Stk.	Dec. 28	4	Do. 4 p.c. Deb.	105—110	..	3 12 9
				WATER COMPANIES.			
780,499	Stk.	Dec. 28	11	Chelsea, Ord. . .	295—300	..	3 13 4
150,000	,,	,,	5	Do. 5 p.c. Pref. .	155—160	..	3 2 6
160,000	,,	,,	4½	Do. 4½ p.c. Pref. '75	140—145	−1	3 2 1
175,785	,,	Mar. 28	4½	Do. 4½ p.c. Deb. .	140—145	..	3 2 1
1,720,560	Stk.	Apl. 12	7	East London, Ord.. .	188—193*	..	3 12 6
654,740	,,	Dec. 13	4½	Do. 4½ p.c. Deb. .	145—150	..	3 0 0
797,687	,,	,,	3	Do. 3 p.c. Deb. .	95—97	..	3 2 6
700,000	50	Dec. 13	8	Grand Junction { 10 p.c. max..	107—110	..	3 12 9
310,000	Stk.	Mar. 28	4	{ 4 p.c. Deb..	123—127	..	3 3 0
708,000	Stk.	Feb. 14	14	Kent	300—305	..	4 12 5
160,000	,,	,,	7	Do. New, 7 p.c. max..	200—205	..	3 8 4
1,043,800	100	Dec. 28	10½	Lambeth, 10 p.c. max..	270—280	..	3 15 0
406,200	100	,,	8	Do. 7½ p.c. max..	207—212	..	3 15 5
350,000	Stk.	Mar. 28	4	Do. 4 p.c. Deb..	123—126	..	3 3 6
500,000	100	Feb. 14	13½	New River, New Shares	407—412	..	3 6 9
1,000,000	Stk.	Jan. 31	4	Do. 4 p.c. Deb..	125—130	..	3 1 7
902,300	Stk.	Dec. 13	7	South-wark and { Ord. . . .	188—193	..	3 12 6
126,500	100	,,	7	{ 7½ p.c. max.	175—180	..	3 17 9
489,200	Stk.	,,	5	{ 5 p.c. Pref. .	153—158	−2	3 3 3
1,019,585	,,	Apl. 12	4	Vauxhall { 4 p.c. A Deb.	124—128*	..	3 2 6
1,155,066	Stk.	Dec. 13	10	West Middlesex. . .	265—275	..	3 12 9
200,000	,,	,,	4½	Do. 4½ p.c. Deb. .	140—145	..	3 2 1
200,000	,,	Mar. 14	3	Do. 3 p.c. Deb. .	96—98	..	3 1 3
					*Ex. div.		

There has been some little scarcity for early shipment. Best Northumbrian steam coals are about 12s. 6d. per ton f.o.b.; and steam smalls are rather scarce at 6s. to 6s. 6d. In the gas coal trade, many of the large contracts have been fixed at the prices last named; and thus there is rather more settlement in the trade. For occasional cargoes of best Durham gas coals, from 9s. 6d. to 10s. per ton f.o.b. is the current quotation; but about 9s. per ton is the f.o.b. quotation for coal forward. In coke, there is a better demand, and prices are firm for both export and home use. Foundry coke is 17s. 6d. to 18s. per ton f.o.b.; and blast-furnace coke is from 14s. 3d. to 14s. 9d. per ton at the furnaces. Gas coke is now less plentiful; and the price may be said to be from 12s. to 13s. per ton f.o.b. At the end of the week all the coal prices above quoted, though still adhered to on paper, are made more or less nominal by the disorganization of the coal trade by the Budget proposal of an export duty on coal.

Scotch Coal Trade.—The trade is in a state of upheaval, consequent upon the imposition of the export duty. The questions raised affect the whole of the United Kingdom; and thus the fortunes of the trade in Scotland will be the same as in the other coalfields. There is a feeling that the Chancellor of the Exchequer is not likely to give way upon the question of contracts entered into, because he would lose a large amount of revenue by so doing. In the event of his holding to his present proposal, there would be an attempt on the part of coalmasters to extract the duty from home consumers; and in this way coal might be higher in price. Current quotations are not very reliable. They are: Main 9s. to 9s. 3d. per ton f.o.b. Glasgow, ell 10s. 6d. to 11s. 6d., and splint 10s. 6d. to 11s. The shipments for the week were 170,711 tons—an increase of 24,827 tons upon the previous week, but a decrease of 40,382 tons upon the corresponding week of last year. For the year to date, the total shipments have been 2,290,802 tons—a decrease of 608,164 tons upon the same period of last year.

Gas Shareholders on Public Bodies.—At a meeting of the Falmouth Town Council on Thursday last, Mr. E. Williams moved a resolution of which he had given notice, proposing that the opinion of the Town Clerk be taken as to the legality of members of the Corporation who are shareholders in the Gas Company taking part in discussions and voting on matters connected with the supply of gas to the Corporation. The Town Clerk had prepared a reply, and this was read. After referring to the section of the Municipal Corporations Act which provides that a member shall not vote or take part in the discussion of any matter in which he has a pecuniary interest, the Town Clerk said it was impossible to lay down any binding rule as to what was "pecuniary interest," but it was quite clear that every member of the Corporation who was a shareholder in the Gas Company was prohibited from speaking or voting on any question before the Council or a Committee thereof in which the Gas Company had a pecuniary interest. This would practically mean any arrangement affecting the public lighting of the town. There might be exceptions; but it was impossible to enumerate them.

Macclesfield Gas Supply.—From the ratepayers' point of view, a very gratifying announcement was made by Alderman Eaton, the Chairman of the Gas Committee of the Macclesfield Corporation, at a special meeting of that body held last Wednesday. He stated that the net profit realized by the gas undertaking in the past financial year amounted to £4497, compared with £4880 in the preceding twelve months, the whole of which would be handed over in relief of the rates. The gross profit was £8521, against £8878. Considering that a higher figure had to be paid for most of the coal, and that not only was the charge for gas not raised, but that the town was lighted at cost price, it is quite understandable that the Chairman's announcement, as the local paper records, "gave much gratification." As the Manchester Gas Department have to reduce their contribution to the rates from £51,900 last year to £11,000 now, while keeping up the price charged in the out-districts, Macclesfield may justifiably congratulate itself on possessing a Gas Committee who are excellent men of business, even if, at times, their proceedings are not so harmonious as they might be, and on having at their gas-works an Engineer of Mr. E. L. Newbigging's capability. Good management in all departments has produced the excellent results above recorded.

Relieved Rates v. Starved Works at Smethwick.—At the Meeting of the Smethwick Town Council last Tuesday, the Mayor (Alderman Jabez Lones) presiding, the Gas Committee reported that, at their meeting, accounts were passed which included a sum of £926 19s. 10d. for the various instalments to the sinking fund, and a cheque was signed for £2000 in favour of the district rate account, being the contribution from profits promised for the year ended the 31st of March. Mr. W. H. Goodyear drew attention to the fact that the gas accounts rendered for the past quarter were from 25 to 40 per cent. more than for the corresponding quarter last year. Not only was there, he said, an advance in the price, but also an increase in the gas consumed. A great quantity of gas was being rushed through their meters and burners, and it caused considerable dirt. At the present time it was most unsatisfactory. Mr. Stones said he had heard a great deal about the increase in the bills. The Gas Committee were willing to have the meters tested; and if there was any discrepancy they would make it right at once. But there was no doubt the meters were correct, and that the gas registered and charged for had been burnt. As to the quality, he considered it was much better than it was last year—in fact, their tests showed this. Mr. Heeley said he could not agree with Mr. Stones, for he did not think he ever burnt such poor gas. As to the £2000 which was applied in relief of the rates, it seemed to him that they were paying twice as much in increased gas bills. If they could not afford to relieve the rates without raising the price of gas, he thought it was better not to relieve them at all. Another councillor complained that the mains were inadequate. He said he did not think he ever worked with a Board who were so crippled as were the Gas Committee. It was like making gas without money. They required better plant for purification, and better means of distribution. Some thousands of pounds ought to be spent if they wished to make the gas undertaking a first-class concern. The report was adopted.

CARBURETTED WATER-GAS APPARATUS

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The above Company have erected since 1893, or are now erecting, their Universal Type of Carburetted Water-Gas Plant at the following Gas-Works:—

	Cubic Feet Daily.
BLACKBURN	1,250,000
WINDSOR ST. WORKS, BIRMINGHAM	2,000,000
SALTLEY WORKS, BIRMINGHAM	2,000,000
COLCHESTER	300,000
BIRKENHEAD	2,250,000
SWINDON (New Swindon Gas Co.)	120,000
SALTLEY, BIRMINGHAM (Second Contract)	2,000,000
WINDSOR ST., BIRMINGHAM (Second Cont.)	2,000,000
HALIFAX	1,000,000
TORONTO	250,000
OTTAWA	250,000
LINDSAY (Remodelled)	125,000
MONTREAL	500,000
TORONTO (Second Contract; Remodelled)	2,000,000
BELLEVILLE	250,000
OTTAWA (Second Contract)	250,000
BRANTFORD (Remodelled)	200,000
ST. CATHERINES (Remodelled)	250,000
KINGSTON, PA.	125,000
PETERBOROUGH, ONT.	250,000
WILKESBARRE, PA.	750,000
ST. CATHERINES (Second Contract)	250,000
BUFFALO, N.Y.	2,000,000
WINNIPEG, MAN.	500,000
COLCHESTER (Second Contract)	300,000
YORK	750,000
ROCHESTER	500,000
KINGSTON, ONT.	300,000
CRYSTAL PALACE DISTRICT	2,000,000
DULUTH, MINN.	300,000
CATERHAM	150,000
LEICESTER	2,000,000
ENSCHEDE (HOLLAND)	150,000
BUENOS AYRES (RIVER PLATE CO.)	700,000
BURNLEY	1,500,000
KINGSTON-ON-THAMES	1,750,000
ACCRINGTON	500,000
TONBRIDGE	300,000
STRETFORD	600,000
OLDBURY	300,000
TODMORDEN	500,000
SALTLEY, BIRMINGHAM (Third Contract)	2,000,000
YORK (Second Contract)	750,000
ROCHESTER (Second Contract)	500,000
NEWPORT (MON.)	250,000
TOKIO, JAPAN	1,000,000

Complete Gas-Works at NELSON, BRITISH COLUMBIA.

ORDERS RECEIVED IN 1901 TO MARCH 1 . . . . 3,500,000 CUB. FT. DAILY.

Strike at the Bombay Gas-Works.—Towards the close of last month, a strike of retort-house hands took place at the works of the Bombay Gas Company. The Manager (Mr. F. W. Chamberlain) and his assistants effectually coped with it; but it nevertheless caused some temporary trouble, as the European officials had (greatly to their credit) to do the stoking work until the new hands who were at once engaged had been drilled. These have rendered better service than the displaced men, who are anxious to be reinstated. The inconvenience caused by the strike was of short duration.

New Joint-Stock Companies.—The Golant Water-Works Company, Limited, has been registered with a capital of £400, in £1 shares, to supply the village of Golant, in Cornwall, and neighbourhood, and other places in England and Wales, with water, and to carry on the business of a water-works company. The "H. C. L. Gas-Stove, Limited," is the title of a Company formed with a capital of £40,000, in £1 shares, to adopt an agreement with R. Dawson and P. Castle, to acquire a certain invention, and to carry on the business of dealers in stoves, ranges, lamps, and other cooking, lighting, or ventilating apparatus, &c. The Naas Gas Company, Limited, has been registered with a capital of £4000, in 4000 shares of £1 each, to acquire the business of gas engineers, gas manufacturers, dealers in coal, coke, tar, &c., and all other business now carried on by the Naas Gas Company, Limited, which was constituted under a Memorandum of Association dated July 8, 1864, for the purpose of selling gas to light the town of Naas, Co. Kildare.

The Mond Gas Bill.—A meeting of owners and ratepayers was held at Stourbridge on Monday last week, to consider the expediency of opposing the Mond Gas Company's Bill, in accordance with a petition already lodged by the Council. Mr. Isaac Nash (Chairman of the Council) presided, and said it was not intended to use the money of the ratepayers in any factious opposition to the Mond scheme, but to protect the interests of the ratepayers, having regard to the large stake the town had in the gas-works. The Clerk read the petition against the Bill, in which it was stated that the town had invested £140,000 in its gas undertaking, and about nine-tenths of the area of supply might be, or would be, affected by the grant to the Mond Gas Company of the powers contained in their Bill. It was highly important, if the Bill should be passed, that the petitioners' existing interests should be fully and adequately provided against loss and injury by the Company's operations. The petition (which was of considerable length) set forth that the petitioners were fully alive to the importance of developing manufacturing processes in their district, had no desire wholly to exclude the Company's operations, but submitted their own undertaking should be protected. After some questions had been asked regarding the petition, the Chairman moved a resolution affirming that it was expedient to oppose the Bill, and this was carried. At a meeting of the Oldbury District Council on Tuesday, the Clerk reported that efforts were being made to obtain satisfactory terms with the Mond Gas Company, but up to the present no reply had been received. It was unanimously resolved to oppose the Bill. The same day the Smethwick Town Council came to a similar conclusion.

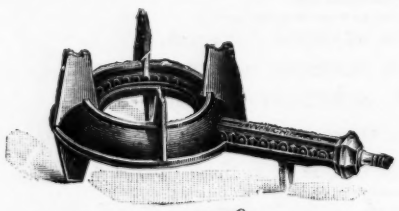
Accident at the Birmingham (Windsor Street) Gas-Works.—Last Friday afternoon, the Works Manager of the Windsor Street gas-works of the Birmingham Corporation, Mr. F. S. Green, met with a serious accident. Mr. Green was superintending the working of a new steam capstan, which was being tested by drawing up several trucks. Unfortunately, one of his legs was caught in a loop of the rope attached to the capstan, and before the machinery could be stopped he was dragged round. His right leg was severely crushed, and there was a compound fracture of the left leg, and also of the right arm. He was taken to the General Hospital in a serious condition.

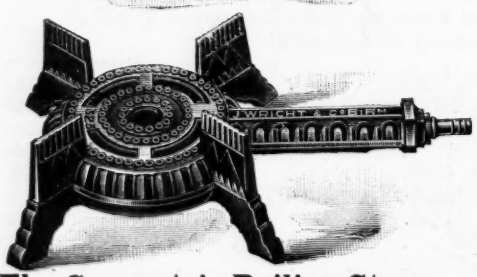
A Ship Classed as a Factory.—At the Bow County Court, on Monday last week, his Honour Judge French decided that a ship in dock is "a part of the plant that is being used from the quay to load it," and is therefore a factory. Hence a plumber's labourer named Higgins, who was hurt by a falling water-trough while at work on the P. and O. boat *Oriental* in the Royal Albert Dock, was awarded 15s. a week compensation. His Honour said it was a new point, but a perfectly correct one. The Appeal Court had decided that whatever floated in a dock on which people were working was not within the Act, but the dock was. Stay of execution was granted, and leave given to appeal.

Large Gas Profits at Blackpool.—At a special meeting of the Gas Committee of the Blackpool Corporation last Thursday, the Gas Engineer and Manager (Mr. John Chew) stated that the available net surplus profits of the gas undertaking for the past financial year amounted to £9700. This remarkable success has been achieved by Mr. Chew notwithstanding that his raw material cost 5s. per ton more than in the preceding twelve months, and that no increase was made in the price of gas. There were 450 million cubic feet of gas made in the twelve months—an increase of about 5 per cent. on the previous year. The profits are more than double the amount anticipated in the estimates; and they represent a trifle less than 7d. in the pound on the rateable value of the borough.

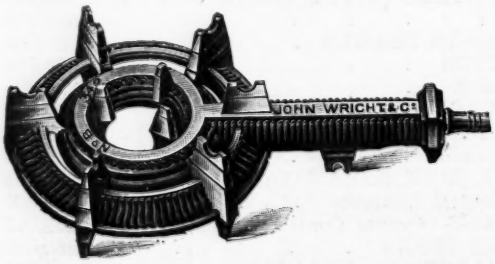
Sales of Stock and Shares.—At the Mart, Tokenhouse Yard, last Tuesday, Mr. Alfred Richards sold £1500 of 5 per cent. preference stock of the South Essex Water-Works Company at from £124 to £129 per £100 of stock. In conjunction with Mr. W. Ashmole, Secretary of the Ilford Gas Company, he carried out the Directors' instructions to offer for sale £7500 of ordinary "C" stock of the Company, ranking for a standard dividend of 5 per cent., subject to the sliding-scale, and entitled, in view of the dividends paid since 1897, to 6 per cent. It was put up in £100, £50, and £20 lots, and was eagerly bought at prices ranging from £114 to £117 per £100 lot, £58 to £59 per £50 lot, and £24 and £24 10s. per £20 lot; the total amount realized by the sale being a premium of £1207 on the issue. On the same day, the Portsmouth Water Company disposed by auction, through Messrs. Love and Cooper, of an additional 1500 new 5 per cent. shares of £5 each, authorized by the Company's Water Order of 1898. They were put up in lots of five; and the majority were placed at £6 15s. per share. The sale produced £10,170 11s. 6d.; the premium realized being regarded as highly satisfactory.

WRIGHT'S GAS BOILING STOVES.





The Concentric Boiling Stove.



No. B319	5 in. diameter . .	**Price**	**1s. 0d.**
No. B320	6 in. ,, . .	,,	**1s. 6d.**
No. B321	5 in. wide by 10 in. long	,,	**2s. 6d.**
No. B322	6 in. ,, 12 in. ,,	,,	**4s. 0d.**
No. B323	8 in. ,, 14 in. ,,	,,	**5s. 9d.**
No. B341	5½ in. diameter . .	,,	**1s. 9d.**
No. B342	7 in. ,, . .	,,	**2s. 6d.**
No. B343	9 in. ,, . .	,,	**3s. 6d.**

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BIRMINGHAM, LONDON, MANCHESTER, LIVERPOOL, & BRISTOL.

Rotterdam Gas Coal Contract.—All the coal for the Rotterdam Gas-Works—90,000 tons—will be obtained this year from England, instead of the contract being equally divided between this country and Germany. The price is 9s. 6d. to 10s. per ton f.o.b.

Gas v. Electricity at Woking.—At last Wednesday's meeting of the Woking District Council, the representatives of the Station ward made a last attempt to retain their electric street lighting, but were unsuccessful; the motion for the rescision of the Council's resolution accepting the Gas Company's tender being defeated by nine votes to seven.

A Magistrate on "Demoralizing Municipalization."—In the course of his remarks when presiding at the eighth annual dinner of the Leicester Ratepayers' Association last Tuesday, Sir Israel Hart, J.P., dealt rather severely with the subject of municipalization. He said he was glad to accept the invitation of the Association to take the chair, because, if ever there was a time in the history of the town when a Ratepayers' Association was necessary, it was now. The rates, notwithstanding the profits they were getting from their municipal trading—the gas, water, and electric light undertakings, including the School Board rate—were something like 6s. in the pound. Some fifteen years ago, before they were in possession of these works, the rates were not very much more than 3s. He characterized these profits from the gas and other undertakings as demoralizing to the Council, for it caused them to spend much more money than they should. It had not been an unmixed benefit, but had to some extent been an evil. The Council had been able to borrow money at low rates of interest, and had launched into unnecessary expenditure. He concluded by exhorting the Association to make themselves more of a power in the town, and to infuse more vitality into it.

Water-Rates on Small Property.—At the Penge Police Court, last Tuesday, the Lambeth Water Company were summoned by Mrs. Alice Preece for unlawfully cutting off the supply of water to No. 70, Maple Road, contrary to the Water Companies (Regulation of Powers) Act, 1887. Mr. Mullen, who appeared for the complainant, said the owner of the house was formerly Mr. Garrett, who always paid the water-rate. The property was sold to a Mr. Prince, who was treated by the Company as the new landlord—they always looking to him for the rate. Mrs. Preece stated that she told the collector that there was a new landlord, and when Mr. Prince came to collect the rent she gave him the demand-note. Owing to the rate not being paid, the water was cut off for 25 days. In cross-examination by Mr. Muir, who represented the Company, witness stated that notice was served on her that the water would be cut off within seven days if the amount owing was not paid. Mr. Muir submitted that there was no case to answer. The Act applied to cases in which the owner, not the occupier, was liable by law or agreement for the water-rate. The owner was only liable by law where the tenancy was under the value of £10; and this was not the case here, as Mrs. Preece paid 10s. a week rent. There was no evidence that the owner entered into an agreement with the Company; and they were absolutely within their rights in cutting off the water. Mr. Mullen contended that the Company's conduct showed that there was an implied agreement. The Chairman (Mr. J. Tolhurst) said the summons must be dismissed, as it failed on the point that there was no evidence of any agreement having been made between Mr. Prince and the Company; and therefore the tenant was liable. Mr. Muir said the Company sympathized with Mrs. Preece, who, owing to her landlord's breach of contract, had been placed in her present difficulty.

The Price of Gas in North London.—A meeting of gas consumers was held last Tuesday night, in the hall of the Club Union, Clerkenwell Road, to protest against the price of gas charged on the north of the Thames by the Gaslight and Coke Company. Mr. Jessie Argyle presided; and among those present were Mr. T. Lough, M.P., and Mr. E. H. Pickersgill. The Chairman stated that a petition was being largely signed for presentation to Parliament, praying that no further powers should be given to the Company until they had put their business in order, and had thus brought about a considerable reduction in the price of gas. Mr. Pickersgill moved the first resolution, protesting against the charge for gas being 3s. 5d. per 1000 cubic feet on the north side of the Thames against 2s. 8d. charged on the south side, and asking Parliament not to grant the Gaslight and Coke Company any further powers until they had reduced the price. The motion was carried. A resolution was also adopted requesting the Local Authorities of London to combine to ask Parliament to insist upon the insertion in the South Metropolitan Gas Company's Bill of a clause protecting the consumers north of the Thames from the high charges from which they now suffer.

Morecambe Gas-Works Purchase.—At the last monthly meeting of the Morecambe District Council, Mr. R. B. Abbott, in moving the adoption of the minutes of the Gas Committee, embodying the terms of the purchase already published, said the gas-works had now been transferred to the town, and everything had been satisfactorily completed. No doubt many complaints had been heard in the town with regard to the high price the Council had paid for the undertaking. Well, that alleged high price was a question of argument. He had noticed in the newspapers that the gas-works at Ossett had been purchased by the Corporation at a higher price than that paid by Morecambe. He thought it a matter of congratulation that the Council had now satisfactorily concluded the purchase. It had not been the easiest thing in the world to accomplish; but the relationship between the Council and the Directors of the Gas Company had been very friendly throughout the negotiations. They might not have seen eye to eye with each other all along; and there had been hitches. But when the purchase was concluded, everything was quite satisfactory to both sides. The extra rate that would be required to meet the repayment of the gas-works loan would not perhaps be as large as they had at first expected. In reply to Mr. Birkett, the Chairman stated that they had an agreement with the Company that the services of the Gas Manager (Mr. W. Duff) should be retained by the Council, and that he should devote the whole of his time to the works.

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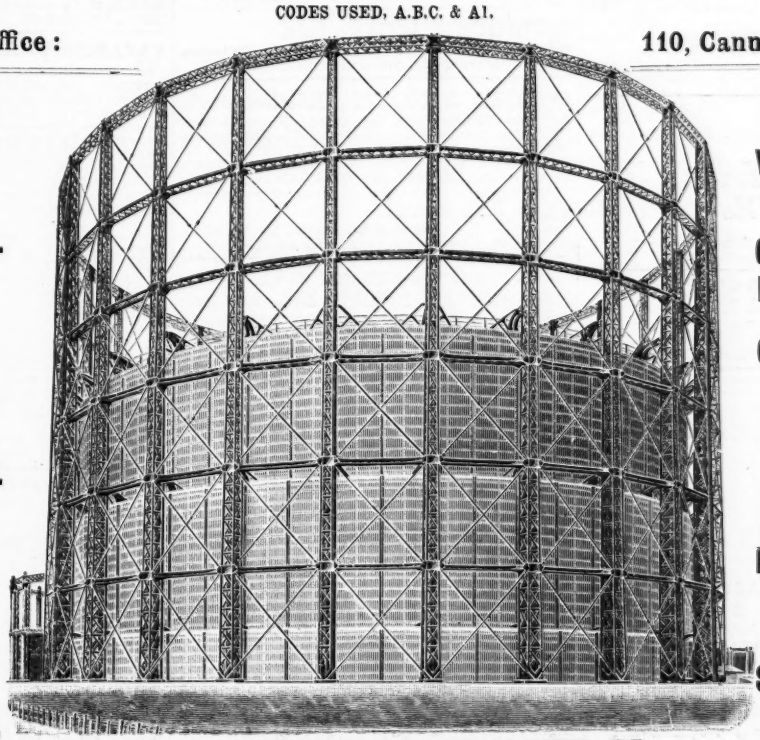

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CENTRE & FOUR-WAY VALVES.

HYDRAULIC MAIN VALVES.

RETORT-MOUTHPIECES.

SLIDE-VALVES, TAR-BURNERS, SIEVES.

GASHOLDERS.

The Southport Corporation have accepted the tender of West's Gas Improvement Company, Limited, for the supply of coke-handling plant for their gas-works, at a cost of £2051.

At the ordinary general meeting of the Imperial Continental Gas Association on the 7th prox., the Directors will recommend a dividend at the rate of 5 per cent. for the half year.

The costs of the London County Council in connection with the recent inquiry respecting the Water Companies' regulations amounted to £1600; and the outlay of the Local Authorities was proportionately heavy.

Messrs. Graham, Morton, and Co., Limited, have received large orders for elevating and conveying machinery from the Gaslight and Coke Company, for their Bow Common and Fulham stations, in connection with the installations of inclined retorts now being erected at these works.

Tenders having been invited for 2000 tons of cast-iron water-mains for the Stockholm Water-Works, to be delivered in the summer, eight offers were received, and the contract has been given to the Cochrane Grove Works, Middlesbrough; the total amount being about £10,000. The mains are to sustain a pressure of 18 atmospheres.

We have received a copy of a new fortnightly penny publication entitled "Electrical Investments," published by the Manual of Electrical Undertakings, Limited, of Norfolk Street, Strand—the establishment from which the "Manual" of Mr. E. Garcke is issued. The contents of the paper, as indicated by the title, are of a financial character, and include a market report and share list.

The London County Council having drawn the attention of the St. Pancras Borough Council to an alleged nuisance arising from the issue of black smoke from the electric generating station in Longford Street, the Public Health Committee sought legal opinion as to whether the Borough Council could proceed legally against one of its own departments for an offence under the Public Health (London) Act, 1891. This opinion is to the effect that no such action would lie.

At the Market Hall, Redhill, last Tuesday, an exhibition of gas cooking-ranges, gas-fires, and other appliances for domestic labour-saving, manufactured by Messrs. Fletcher, Russell, and Co., Limited, was opened by Mr. D. H. Helps, Engineer of the Redhill Gas Company, under whose auspices it was held. The exhibits embraced a variety of grillers and lavatory appliances, including apparatus for heating baths, &c. The attendances at the exhibition, which closed on Friday, were large; its attractions being greatly enhanced by the lectures and cookery demonstrations given by Miss Rose Brown.

The opening, on Easter Tuesday, of St. Luke's Hospital, the new Infirmary which the Halifax Board of Guardians have erected at Salterhebble at a cost of nearly £100,000, calls for notice in these columns from the fact that its water-supply arrangements possess a feature which we believe to be unique. Not an inch of lead has been used, the water being conveyed through "Health" pipes supplied and fitted by Messrs. E. Walker and Co., of Heckmondwike. It may be mentioned, as a striking example of careful calculation, that the work has been carried out to the plans of Mr. W. Clement Williams, F.R.I.B.A., the Architect, not only without a penny of extras, but at a good deal below the estimates.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or Stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

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O'NEILL'S Oxide has a larger annual sale than all other Oxides combined. Purity and uniformity of quality guaranteed.

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"VOLCANIC" FIRE CEMENT.

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Regenerator or other Furnaces erected to Engineers' own Designs. Best Work Guaranteed. Please write for Estimates.

TO GAS AND WATER OFFICIALS.

HIGH-CLASS CYCLES at Reasonable and LOW PRICES. Guaranteed and sent on approval. For Cash or Gradual Payments. Catalogue post free. Old Machines Exchanged or Repaired.
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J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM; and 45 & 47, Westminster Bridge Road, LONDON, S.E.
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PREPARED from Pure Iron.
Twice as Rich as Bog Ore.
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BROTHERTON AND CO., Chemical Manufacturers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

SADLER & CO., Ltd., Middlesbrough, Tar Distillers and Tar Colour Manufacturers. BENZOL specially prepared for Gas Enrichment free from Sulphur. Pure Hydrated OXIDE OF IRON for Purifying Gas either for Sale or Lent on Hire. Always Buyers of GAS TAR and AMMONIACAL LIQUOR.

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Telegrams: "LUMINOSITY."

PORTER & CO., Gowts Bridge Works, LINCOLN, Engineers, Ironfounders, and Contractors for the erection of Gas-Works for Towns, Villages, Mansions, Manufactories, Collieries, and Isolated Buildings at home and abroad. Manufacturers of Retorts and Fittings, Condensers, Scrubbers, Purifiers, Valves, &c.; also of Girders, Wrought and Cast Iron Tanks, Iron Roofs, &c.
Telegraphic Address: "PORTER, LINCOLN."
[For Illustrated Advertisement, see April 5, p. 10.]

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BROTHERTON AND CO., Ammonia Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

SULPHATE OF AMMONIA SATURATORS and LEAD WORK for Sulphate of Ammonia Plants.
For REPAIRS or ALTERATIONS, ring up "0848 BOLTON," or Telegraph "SATURATORS, BOLTON."
Largest Practice and most Up-to-Date Works in Britain.
JOSEPH TAYLOR AND CO., Central Plumbing Works, Victoria Square, BOLTON.

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BALE'S Special Fire Cement should be used to keep Retorts, Furnaces, &c., in good repair during the heavy Winter Work.
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FIRST-CLASS Tinmen Wanted.

Send full Particulars to GREENALL'S POSITIVE METER SYNDICATE, LIMITED, 63, Kirkstall Road, LEEDS.

WANTED, a Water Main and Service LAYER (Handy Fitter preferred).
Particulars of Qualifications, Experience, and Testimonials to be sent to the SECRETARY, Water-Works Offices, NEWMARKET.

WANTED, a Manager's Clerk in a large Gas-Works. Shorthand and Typewriting necessary. Commencing Wages 25s. per week.
Apply, by letter, to No. 3667, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

EXPERIENCED Surveyor and DRAUGHTSMAN required for large Provincial Water Company. Must be well up in Theodolite Work.
Applications, stating Age, Experience, and Salary required, to No. 3677, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Main and Service Layer, used to Large and Small Pipes, also control of Men. Must be steady. References required. Wages 6s. per day.
Apply, by letter, to No. 3678, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

DRAUGHTSMAN wanted, with ex- perience in Elevating and Conveying Machinery, Inclined Retort Installation, Structural Work, and Gearing. Only those with experience in this class of work need apply.
Apply, stating Age, Wage, and Experience, to GRAHAM, MORTON, & CO., Black Bull Street, LEEDS.

SPANISH GAS-WORKS.

WANTED, a Working Manager for a Small Gas-Works in Spain, making about 5 million cubic feet per annum. All applicants must be practical Men, and speak Spanish.
Address letters, with *copies* of Testimonials, to No. 3680, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Man who understands Gas Stoves, Meters, Burners, and Fittings, to TAKE CHARGE of the Sale of Gas Stoves and Burners, and attend to all complaints of insufficient supplies of Gas.
Applications to be sent in on or before the 29th inst.
For further Particulars, apply to the undersigned, at the Gas Offices, Low Bridge, Keighley.
By order,
JOHN LAYCOCK,
Engineer and Manager.

April 17, 1901.

CLERK OF WORKS.

A FIRM of Contracting Gas Engineers have a vacancy for an OUTDOOR CLERK OF WORKS under 25 Years of Age. One experienced in Gas-Works Construction preferred. Permanency to a suitable Man.

Reply, stating full Particulars of past Experience and Salary expected, to No. 3676, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

CONSULTING GAS ENGINEER.

WANTED, a qualified Gentleman to inquire into and examine the Clonmel Gas-Works, and to report thereon to the Gas Committee of the Clonmel Corporation.

Applications, stating Terms and Qualifications, to be sent to PATRICK NUGENT, Esq. (Chairman of the Committee), 71, O'Connell Street, Clonmel, by the 7th of May, 1901, who will supply all Information upon application.

SHEFFIELD UNITED GASLIGHT COMPANY.

WORKS SUPERINTENDENT.

WANTED, by the Directors of this Company, an experienced and competent Man to act as SUPERINTENDENT at their Effingham Street Gas-Works. (The position is vacant owing to the present Superintendent having been promoted.) He will be required to reside on the Works, with House and Coal Free.

The Maximum Make of Gas at this Station is about 3¼ million cubic feet per day.

Applications (marked "Superintendent"), stating Age, previous Engagements, and Salary required, to be made, by letter only, addressed to Sir Fredk. T. Mappin, Bart., M.P., Chairman of the Company, Gas Offices, Sheffield, not later than Friday, April 26, 1901.

Testimonials not to be sent till asked for.

HANBURY THOMAS,
General Manager and Secretary.

Commercial Street, Sheffield,
April 4, 1901.

URBAN DISTRICT COUNCIL OF TEIGNMOUTH.

APPOINTMENT OF GAS MANAGER.

THE Urban District Council of Teign- mouth invite APPLICATIONS for the post of MANAGER of their Gas-Works.

Applicants must be thoroughly competent Men, and have a practical knowledge of the manufacture of Gas, Sulphate of Ammonia, and all Residuals.

The Annual make of Gas is about 24 million cubic feet.

Salary £150 per annum, with House and Gas free.

Applications, stating Age, present or past Employment, giving full Particulars, together with *copies* of three recent Testimonials, to be sent to me, the undersigned, not later than Saturday, the 27th day of April, 1901.

Canvassing will be deemed to be a disqualification.

By order,
A. PERCIVAL DELL,
Clerk to the Council.

Town Hall, Teignmouth,
Devon, April 4, 1901.

URBAN DISTRICT OF NEWTON-IN-MAKERFIELD.

GAS AND WATER ENGINEER.

THE Council for the above-named Dis- trict invite APPLICATIONS for the position of GAS and WATER ENGINEER.

Candidates must be not less than 24, nor more than 40 years of age, and be competent to prepare all Plans and Drawings, and to supervise the Erection, of additional Buildings, Machinery, and Plant at the Water Pumping-Station and Gas-Works, as may be required from time to time. He must also have a thorough practical knowledge of the most Modern Systems and Appliances for Raising and Distributing Water, and the Manufacture and Distribution of Gas, and be able to carry out the laying of such additional Gas and Water Mains as the Council may direct.

The Engineer appointed will be required to devote the whole of his time to the duties of the Office.

Salary commencing at £200 per annum, rising to a maximum of £350 per annum.

The appointment will be subject to three months' notice on either side.

Applications, accompanied by *copies* of not more than three Testimonials of recent date (which will not be returned), to be forwarded to the undersigned, not later than Saturday, the 27th of April next, endorsed "Gas and Water Engineer."

Canvassing the Members of the Council, either directly or indirectly, will be deemed a disqualification.

C. COLE,
Clerk to the Council.

Town Hall, Earlestown,
Lancs., April 15, 1901.

WANTED, a Gas-Works on Lease or Purchase, by thoroughly practical Gas Engineer. Address No. 3665, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

FOR SALE—A few Ordinary Shares of Messrs. GLOVER AND MAIN, LIMITED.

Address, stating Price, to No. 3679, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GAS Standards from St. John's Church, Eton, FOR SALE in consequence of Alterations. Nine Iron valued at 20s. each, and Four Brass at 30s. each. No reasonable offer refused. Photo sent.

Apply to the CHURCHWARDENS.

FOR SALE—A Set of Four Purifiers, each 6 feet square, four Tiers (for Lime). In good order.

Apply to the SECRETARY, Gas Company, Marlow, BUCKS.

WIDNES GAS-WORKS.

FOR SALE—Seven Sets of Second-hand Ω shape RETORT MOUTHPIECES, 15 in. by 18 in., for Settings of Sixes, with Self-Sealing Lids. West's make. Will be put into thorough working order before being sold.

Apply to the MANAGER.

TO BE SOLD—

SINGLE GASHOLDER, 30 ft. by 10 ft. Five Columns.
SINGLE GASHOLDER, 22 ft. by 10. ft. Four Columns.
SIX DONKEY PUMPS, various sizes to 20-horse power.

Write J. WRIGHT, Bridge House, BLACKFRIARS, E.C.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.

J. F. BLAKELEY Gas Engineer, Thornhill, DEWSBURY.

ASHFORD URBAN DISTRICT COUNCIL.

TENDERS FOR GAS COALS.

THE Gas Committee are prepared to re- ceive TENDERS for the supply of 5500 Tons of good GAS COAL.

Forms of Tender and Information may be obtained on application (in writing only) from J. Morton, Manager, Gas-Works.

Tenders, endorsed "Coal," are to be delivered at or before Five p.m. on Friday, April 26, 1901, at my Office, 11, Bank, Ashford, Kent.

JOHN CREEBY,
Clerk.

April 15, 1901.

DEVONPORT GAS AND COKE COMPANY.

TENDERS FOR GAS COALS.

THE Directors of the Devonport Gas and Coke Company invite TENDERS for the supply of 22,000 Tons or 10,000 Tons (at their option) of unscreened Through and Through Newcastle or Durham GAS COALS, to be shipped in such quantities and at such times as may be required between the 8th of May, 1901, and the 31st of May, 1902.

The Cargoes to be discharged at the Tamar Wharf, Devonport.

Tenders may be quoted either c.i.f. or f.o.b. (c.i.f. preferred), endorsed "Tender for Coals," and addressed to the Chairman, Devonport Gas and Coke Company, Devonport.

Tenders to be sent in on or before Monday, the 29th inst.

Devonport, April 16, 1901.

TENDERS FOR CAST-IRON PIPES.

THE Brentwood Gas, Coke, and Light Company, Limited, are prepared to receive TENDERS for the supply of 165 Yards of 12-inch and 1000 Yards of 10-inch CAST-IRON GAS-MAIN PIPES, each Pipe to be 9 feet long (Spigot and Socket).

Prices to include delivery to Brentwood Station (G.E.R.).

The Pipes supplied must be cast vertically, and prove clean, true, and flawless, free from inequalities of thickness, or any other defect rendering them liable to fracture or leakage.

Firms tendering must be prepared to give delivery by May 20 next.

No Form of Tender issued.

Tenders, stating weight per yard, to be delivered to the undersigned on or before Monday, May 6 next.

The lowest or any Tender not necessarily accepted.

C. A. FIELDER,
Secretary.

Brentwood, Essex,
April 19, 1901.

TENDERS FOR GAS COAL.

THE Brentwood Gas, Coke, and Light Company, Limited, are prepared to receive TENDERS for the supply of 4500 Tons of good, clean, fresh-worked GAS COAL, screened and unscreened, for the Year ending April 30, 1902.

Deliveries to be free to Brentwood Station (G.E.R.), in quantities to be subsequently determined.

Not less than 2000 Tons of any one description of Coal will be taken.

No Form of Tender issued.

Tenders to be delivered to the undersigned on or before Monday, May 6 next.

The lowest or any Tender not necessarily accepted.

C. A. FIELDER,
Secretary.

Brentwood, Essex,
April 19, 1901.

CONTRACT FOR GAS COALS.

THE Milton-next-Sittingbourne Urban District Council invite TENDERS for the supply and delivery during the Year ending the 2nd of May, 1902, of about 1400 Tons of GAS COALS, to be supplied at such times and in such quantities as the Manager of the Gas-Works shall direct.

Full Information, with Forms of Tender, can be obtained on application to the Manager, Mr. A. Davison, Gas-Works, Milton-next-Sittingbourne.

Sealed Tenders, which must be on the Form supplied, should be addressed to the Chairman of the Milton-next-Sittingbourne Urban District Council, and endorsed "Tender for Gas Coals."

The Tenders should be sent or delivered to me, on or before Monday, the 29th of April, 1901.

The Council do not bind themselves to accept the lowest or any Tender.

By order,
WM. PARHAM,
Clerk.

Milton-next-Sittingbourne,
Kent, April, 1901.

LUDLOW UNION GAS COMPANY.

THE Directors are prepared to receive TENDERS for the supply of from 2000 to 2300 Tons of best screened GAS COAL from June 30, 1901, to June 30, 1902; the Coal to be fresh wrought and free from Bats, Bind, and other Foreign Matter.

The Coal is to be delivered in monthly quantities as directed by the Manager.

All Tenders to be sent in to the undersigned not later than the 20th of May, 1901.

The Directors do not bind themselves to accept the lowest or any Tender.

W. H. WHITEHOUSE,
Manager.

HERTFORD GASLIGHT COMPANY.

TENDERS FOR GAS COAL.

THE Directors of the above Company invite TENDERS for the supply of about 2000 Tons of Unscreened SILKSTONE GAS COAL, delivered at G.N. Rly. Gas-Works Siding, Hertford; and about 1500 Tons of SEABORNE COAL, delivered alongside the Gas-Works Wharf.

Delivery to be as required over the Year ending June 30, 1902.

The Directors reserve the right of dividing the Contract.

Tenders, endorsed "Coal," to be sent in before the 2th of May next.

ROBT. WATSON,
Manager and Secretary.

Gas-Works, Hertford, April 18, 1901.

TAR AND LIQUOR.

TENDERS are invited for the surplus TAR and LIQUOR, produced at the following Gas-Works for a period of One Year, from July 1, 1901.

At the Gas-Works, SUTTON, Surrey (L.B. & S.C.R.).
About 140,000 Gallons of Tar.
,, 140,000 ,, Liquor.
At the Gas-Works, REIGATE, Surrey (S.E.R.).
About 60,000 Gallons of Tar.
,, 120,000 ,, Liquor.
At the Gas-Works, NEWHAVEN, Sussex (L.B.&S.C.R.)
About 17,000 Gallons of Tar.
,, 34,000 ,, Liquor.

Separate Tenders must be sent for Tar and Liquor at the respective Works. The quantities given are only estimated, and may be more or less.

Tenders are to be delivered to the undersigned not later than April 30, 1901.

The highest or any Tender not necessarily accepted.

GEO. MEAD ROBINS,
Engineer and Secretary.

Gas Office, Sutton, Surrey,
April 19, 1901.

UXBRIDGE AND HILLINGDON GAS CONSUMERS' COMPANY.

GAS COAL.

THE Directors of the above Company invite TENDERS for the supply of about 5500 Tons of GAS COAL, deliveries of which are to commence the first week in May, 1901, and finish the last week in April, 1902.

Tenders to be made out for the above quantity of the best description of unscreened Gas Coal, either in whole or part, from or divided between the Durham, Yorkshire, or Derbyshire Pits, delivered by Barge free alongside the Company's Works on the Grand Junction Canal, or by Rail to Uxbridge Station, Great Western Railway.

Tenders are to state the names of the Pits from which the above description of Coal will be supplied; deliveries to be according to the instructions, and to the entire satisfaction, of the Company's Engineer.

Tenders to be received on or before May 2, addressed to the Chairman, Gas Offices, Belmont Road, Uxbridge, Middlesex, and endorsed "Tender for Coal."

A Form of Tender will be sent on application.

W. M. GARDINER,
Secretary.

Uxbridge, Middlesex,
April 18, 1901.

CITY OF CARLISLE.

GELTSDALE WATER SCHEME.

CONTRACT No. 1.

THE Corporation of the City of Carlisle invite TENDERS for the execution of the Works included in this Contract, which comprise the construction of COLLECTING-TANKS; WEIRS; INTAKES; CONDUITS; VALVE, SCREEN, MEASURING, AIR, SCOUR, and other CHAMBERS; RIVER and RAILWAY CROSSINGS; a STORAGE RESERVOIR of about 175 million gallons capacity, formed by an Earthen Embankment 860 feet in length, with a Concrete and Puddle Core 1160 feet in length; with WASTE-WATER WEIR, VALVE TOWER, OUTLET CULVERT, &c.; SCREENING and COLLECTING WELLS; Four FILTERS, each about 10,000 super. feet in area; a STREAM DIVERSION CHANNEL, 1572 yards in length; a SERVICE RESERVOIR, 5 million gallons capacity; 2 miles of STONEWARE PIPE; the laying and jointing of 13 miles of CAST-IRON PIPE, ranging from 20 in. to 16 in. diameter; Two DWELLING-HOUSES and other BUILDINGS; the DIVERSION of a PUBLIC ROAD; the construction of BRIDGES, ACCOMMODATION ROADS, DRAINS, BOUNDARY WALLS, &c.

The Drawings may be seen by appointment with the Engineer, who will also give intending Contractors facilities for inspecting the site of the Works, and furnish all Information that may be required.

Specifications and Bills of Quantities may be obtained on payment of a deposit of £10, which will be refunded after the receipt of a *bond-fide* Tender, together with the return of all documents lent for the purpose of making up the Tender.

Sealed Tenders must be delivered to the undersigned, on or before the 25th day of May, 1901.

CHARLES B. NEWTON, M.Inst.C.E.,
Engineer.

Water-Works Engineer's Office,
Victoria Viaduct, Carlisle, April 4, 1901.

TENDERS FOR GAS COAL.

THE Directors of the Westerham Gas and Coke Company, Limited, invite TENDERS for the supply of about 550 to 600 Tons of best screened GAS COAL, to be delivered to Westerham Station, in quantities of 50 Tons at the time, to suit the convenience of the Directors during the ensuing Year.

Tenders, endorsed "Tender for Coal," to be sent in by May 1, 1901.

The Directors do not bind themselves to accept the lowest or any Tender.

By order of the Directors,
C. W. HOOKER,
Secretary.

Westerham.

SHEFFIELD UNITED GASLIGHT COMPANY.

TO ENGINEERS AND IRONFOUNDERS.

THE Directors of the above Company invite TENDERS for the supply and erection of about 77 Tons of CAST-IRON and STEEL WORK required for the extension of the Coal-Store Roof at their Neepsend Station.

Drawings may be seen, and Specification, with Form of Tender and Bill of Quantities obtained, on application to the Engineer, Mr. J. W. Morrison, at the Company's Offices.

The Directors do not bind themselves to accept the lowest or any Tender.

Sealed Tenders, marked "Coal-Store Roof," must be delivered (by post) not later than the first post on Tuesday, April 30, 1901, addressed to the undersigned.

HANBURY THOMAS,
General Manager and Secretary.

Commercial Street, Sheffield,
April 12, 1901.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his AUCTIONS of STOCKS and SHARES in London, Suburban, and Provincial Gas and Water Companies are held PERIODICALLY, at the Mart, Tokenhouse Yard, E.C.

He also undertakes the issuing by AUCTION of GAS and WATER STOCKS and SHARES under Parliamentary Powers.

Terms for issuing such Capital, and also for including Gas and Water Stocks and Shares in these periodical Sales, can be obtained on application at Mr. ALFRED RICHARDS' OFFICES, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
LEA BRIDGE DISTRICT GAS COMPANY.

NEW ISSUE OF £8900 FOUR PER CENT. PERPETUAL DEBENTURE STOCK.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, April 30, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
WEST HAM GAS COMPANY.

NEW ISSUE OF 2500 £10 ORDINARY SHARES.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Monday, May 13, at Two o'clock, in Lots.

Particulars of the SECRETARY of the Company, at the Offices, Union Street, STRATFORD; and of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
SOUTHEND GAS COMPANY.

NEW ISSUE OF £4200 NEW ORDINARY STOCK.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, May 14, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
SOUTHEND WATER-WORKS COMPANY.

NEW ISSUE OF £2700 FOUR PER CENT. PERPETUAL DEBENTURE STOCK, AND 500 £10 NEW ORDINARY SHARES.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, May 14, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

NEWCASTLE-UPON-TYNE AND GATESHEAD GAS COMPANY.

SALE BY TENDER OF
£34,000 THREE-AND-A-HALF PER CENT. DEBENTURE STOCK.
MINIMUM PRICE, £100 PER CENT.

NOTICE is Hereby Given, that it is the intention of the Directors of this Company to SELL BY TENDER £34,000 of THREE-AND-A HALF PER CENT. DEBENTURE STOCK, to be issued under the Provisions of the Newcastle-upon-Tyne and Gateshead Gas Act 1896.

Particulars and Forms of Tender may be obtained on application to the undersigned, and Tenders must be sent in so as to be received at the Office of the Company not later than Ten a.m. on Tuesday, the 14th of May, 1901.

The Stock will be allotted to the highest bidders; but no Tender will be accepted at a lower price than par.

By order,
THOMAS WADDOM,
Secretary.

Offices: 35, Grainger Street West,
Newcastle-upon-Tyne, April 12, 1901.

LITTLEHAMPTON GAS COMPANY, LIMITED, SUSSEX.

THE Directors of the above Company are prepared to receive TENDERS for the supply of 1000 Yards of 4-inch GAS-MAIN, delivered f.o.r. Littlehampton Station.

Tenders should state Price per ton coated, Date of Delivery, and be addressed to the undersigned not later than the 29th of April, marked "Tender for Pipes."

A. W. ELTON,
Engineer and Manager.

Manager's Office, Littlehampton,
Sussex, April 20, 1901.

BANGOR URBAN DISTRICT COUNCIL. CO. DOWN.

THE above Council are prepared to receive TENDERS for supplying and fixing complete the following Plant at their Gas-Works:—

One ROTARY SCRUBBER-WASHER, with Gas-Engine.
One ROTARY EXHAUSTER.
One 4-Horse Power GAS-ENGINE.
One Set of ANNULAR CONDENSERS.
One Set of three PURIFIERS.

Full Particulars from Mr. BARKER MITCHELL, Manager, Gas-Works, BANGOR.

BARNSLEY CORPORATION WATER-WORKS.
CONTRACT No. 8.

TO VALVE MAKERS.

THE Corporation of Barnsley are prepared to receive TENDERS for certain SCREW VALVES, AIR VALVES, SURFACE BOXES, and other Articles.

The Drawings may be inspected, and Specifications and Forms of Tender may be had, on application at the Office of Messrs. T. & C. Hawksley, Civil Engineers, 30, Great George Street, Westminster, S.W., and at the Office of Mr. J. Henry Taylor, Borough Surveyor, Barnsley, on and after Friday, the 19th of April inst.

Tenders must be delivered at my Office at or before Ten o'clock in the forenoon of Tuesday, the 30th day of April inst.

The Corporation do not pledge themselves to accept the lowest or other Tender.

HENRY HORSFIELD,
Town Clerk.

Barnsley, April 18, 1901.

PRICE'S COKE & COAL BARROW

effects a great saving of time, labour, and expense.

For Particulars Price, &c., apply to Mr. EDWARD PRICE, 119, Queen's Road, FINSBURY PARK, N.

Prices are Reduced.

BOLDON GAS COALS.

Yield of Gas per Ton. .	10,500 Cubic Feet
Illuminating Power . .	16·9 Candles.
Coke	66·7 Coke.
Sulphur	0·86 Sulphur.
Ash	2·04 Ash.

As per Analysis by
Mr. JOHN PATTINSON, F.I.C., F.C.S.

For Prices, &c., apply to
W. H. PARKINSON,
THE HARTON COAL CO., LTD.,
NEWCASTLE-ON-TYNE.

Telegraphic Address: "PARKINSON, NEWCASTLE."

THOMAS TURTON AND SONS, LIMITED,
SHEAF WORKS, SHEFFIELD,
MANUFACTURERS OF
FILES OF BEST QUALITY
FOR ENGINEERS.
STEEL OF ALL DESCRIPTIONS.
SCREW STOCKS, TAPS AND DIES,
SPANNERS, RATCHET BRACES, LIFTING JACKS,
ANVILS, VICES,
AND ENGINEERS' TOOLS GENERALLY.
LONDON OFFICE:
90, CANNON STREET, E.C.

Price 6s., Cloth Bound,
THE CHEMISTRY OF ILLUMINATING GAS.
By N. H. HUMPHRYS, Assoc.M.Inst.C.E., F.C.S.
LONDON:
WALTER KING, 11, BOLT COURT, FLEET STREET, E.C.

UNEQUALLED.
Gas Companies are solicited to try Samples of the
MIRFIELD
BLACK BED GAS COAL.
Prices and Analysis on application.
MIRFIELD (GAS-COAL) COLLIERY COMPY.
RAVENSTHORPE, NEAR DEWSBURY.

HEATHCOTE GAS COAL.
Rich in Illuminating Power and Yield of Gas.
Above the Average in Weight and Quality of Coke.
Maintains a High Standard in Residuals.
THE GRASSMOOR CO., LD.,
CHESTERFIELD.

NEWBATTLE CANNEL.
Highest Results in Gas, & Excellent Coke.
QUOTATIONS ON APPLICATION TO
THE LOTHIAN COAL COMPANY,
LIMITED,
NEWBATTLE COLLIERIES,
DALKEITH N.B.

THORNLEY GAS COALS
WORKED BY THE
WEARDALE IRON & COAL CO., LD.
OUT OF THEIR
THORNLEY AND WHEATLEY HILL COLLIERIES.

Analysis made by
Messrs. J. & H. S. PATTINSON.

Yield of Gas per Ton . .	10,500 Cub. Ft.
Illuminating Power . . .	16·9 Candles.
Coke (of good quality) . .	67·5 per Cent.
Sulphur	0·58 "
Ash	2·73 "

For Price, &c., apply to the
WEARDALE STEEL, COAL, & COKE COMPANY, Ltd.,
QUAYSIDE, NEWCASTLE-ON-TYNE.

WELDON MUD
FOR
GAS PURIFICATION.
For use in the
RECOVERY OF SULPHUR,
ALSO
Removal of last Traces of SULPHURETTED HYDROGEN in catch position.

Full Particulars on application to the Patentees:
GAS DESULPHURIZATION CO.,
— LIMITED, —
1, FENCHURCH AVENUE, LONDON, E.C.

TROTTER, HAINES, & CORBETT, LIMITED,

Brettell's Estate

FIRE-CLAY & BRICK WORKS, STOURBRIDGE.

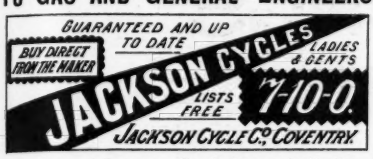
Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.

Special Lumps, Tiles, and Bricks for Regenerative and Furnace Work.

SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.

LONDON OFFICE: R. CULL, 84, OLD BROAD STREET, E.C.

TO GAS AND GENERAL ENGINEERS.



Easy Payment System. *Particulars on Application.*

HEBBURN MAIN GAS COALS.

Yield of Gas per Ton . . 10,500 Cubic Feet.
Illuminating Power . . . 16·4 Candles.
Coke . . . . . 68 per Cent.

For Prices, f.o.b. Ship or Delivered by Rail, apply to

The Wallsend & Hebburn Coal Company, Ltd.

8 Lombard Street,
NEWCASTLE-ON-TYNE.

W. RICHARDSON, Fitter.

HARDMAN & HOLDEN, LD.

ESTABLISHED 1820.

SULPHURIC ACID.

GUARANTEED absolutely free from Arsenic and of excellent Purity. Specially prepared for Sulphate of Ammonia Manufacturers.

Works: BLACKBURN; Miles Platting and Clayton, MANCHESTER.

Head Office: Miles Platting, MANCHESTER

Inquiries Solicited.

HOLMSIDE GAS COALS.

Present Daily Produce over 5000 Tons.

Latest Analysis—By CHARLES PHILLIPS, Gas Examiner to Rotherham Corporation

Yield of Gas per Ton . . . 11,205 Cubic Feet.
Illuminating Power 16 7/10 Stand. Sperm Candl.
Coke (of good & pure quality) 13¾ Cwt. per Ton.
Sulphur . . . . . A little over 1 per Cent.
Ash . . . . . Under 1 per Cent.
Tar . . . . . 163 lbs. (Avoir.) per Ton.
Ammoniacal Liquor 103 lbs. (Avoir.) per Ton.

HOLMSIDE GAS COALS are supplied to the largest Gas Companies in England and on the European Continent; London alone consuming about half the produce.

SOUTH MOOR PELTON GAS COALS.

Present Daily Produce available 3000 Tons.

Of equal quality to the "Holmside" Coal, and also very largely used by many Gas Companies at Home and Abroad.

Both descriptions are shipped at Tyne Docks, and Dunston Staiths, River Tyne, also at North and South Docks, Sunderland.

These Coals may be bought through the Principal Merchants in England, or direct from

MR. MARK ARCHER,
HOLMSIDE & SOUTH MOOR OFFICES,
NEWCASTLE-UPON-TYNE.

NITRATE of Thorium and Cerium.

FABRIK CHEMISCHER PRAEPARATE VON STHAMER, NOACK, AND CO., HAMBURG.

PREPAYMENT ATTACHMENTS AND ALL PARTS FOR GAS & WATER METERS.

Quotations to Samples.

THE

Tourtel Manufacturing Co., Ltd.,

146A, QUEEN VICTORIA STREET, E.C.

Can undertake the Largest Contracts.

HYDRAULIC BLOWER

For blowing Air into Gas Purifiers for the purpose of

REVIVIFYING THE FOULED OXIDE.

Full Particulars on application.

LUXWERKE LUDWIGSHAFEN AM RHEIN.

JAMES OAKES & CO.

ALFRETON IRON-WORKS, DERBYSHIRE,

AND

Wenlock Iron Wharf, 21 & 22, Wharf Road, CITY ROAD, LONDON, N.,

Manufacture and keep in Stock at their Works (also large stock in London)

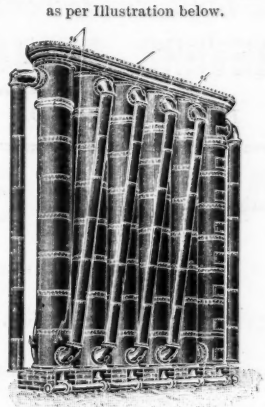
PIPES and CONNECTIONS, 1¼ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with Bolts, Nuts and Covers, and rendering Leakage impossible.

FOR SALE, EXCEPTIONAL BARGAIN IN SECOND-HAND

ANNULAR CONDENSERS

as per Illustration below.



In perfect Order and Condition.
Complete with 16-inch Valves and Connections.
Diagonal Tubes dispensed with if desired.

Cheap, less than Half New Price accepted.

J. FIRTH BLAKELEY & CO.,
THORNHILL, DEWSBURY.

Inspection Invited. Photo, &c., on application.

THE PATENT

"BEACON" GLOBE LAMP.

Largely adopted by many Local Authorities for Public Lighting, being absolutely Shadowless and Wind-proof.

H. GREENE & SONS, Ld.,
Late of Cannon Street,
19, Farringdon Road, E.C.
Telegrams: "LUMINOSITY, LONDON."

Awarded HIGHEST MEDAL and DIPLOMA at the Newcastle-on-Tyne Royal Mining and Industrial Exhibition, 1887, for

CANNEL & COAL.

TYNE BOGHEAD CANNEL.

Yield of Gas per ton . . . . 13,155 cub. ft.
Illuminating Power . . . . 38·22 candles.
Coke per ton . . . . . 1,301·88 lbs.

EAST PONTOP GAS COAL.

Yield of Gas per ton . . . . 10,500 cub. ft.
Illuminating Power . . . . 17·8 candles.
Coke . . . . . 70 per cent.

SOUTH PELAW MAIN GAS COAL.

Yield of Gas per ton . . . . 10,500 cub. ft.
Illuminating Power . . . . 16·3 candles.
Coke . . . . . 73·1 per cent.

For Prices and complete Analysis, apply to

THOS. W. DANCE, SON, & HUNTER,
COAL OWNERS, NEWCASTLE-ON-TYNE
OR
E. FOSTER & CO.,
21, JOHN STREET, ADELPHI, LONDON, W.C.

ESTABLISHED 1873.

Contractors to H.M. Government.

RETORT-SETTINGS

INCLINED, REGENERATIVE, GENERATIVE, AND FLOOR LINE.

SEVERAL THOUSANDS OF OUR SETTINGS IN SUCCESSFUL WORK.

Plans, Estimates, and full Particulars for Complete or Partial Erection and Renewal.

J. & H. ROBUS,

Engineering Contractors for Gas and Water Works,

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And GORING, OXFORDSHIRE.

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RESERVOIRS.

MAIN LAYING.
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WELL SINKING.

D. HULETT & CO., LIMITED.

Show-rooms and Offices: 55 & 56, HIGH HOLBORN, LONDON.

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MANUFACTURERS OF

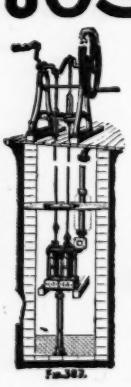
OUTSIDE GAS-LAMPS

Suitable for Incandescent or Ordinary Burners.

DRY GAS-METERS, SERVICE-CLEANSERS, &c., &c.

PRICE LISTS ON APPLICATION.

JOSEPH EVANS & SONS, CULWELL WORKS, WOLVERHAMPTON.



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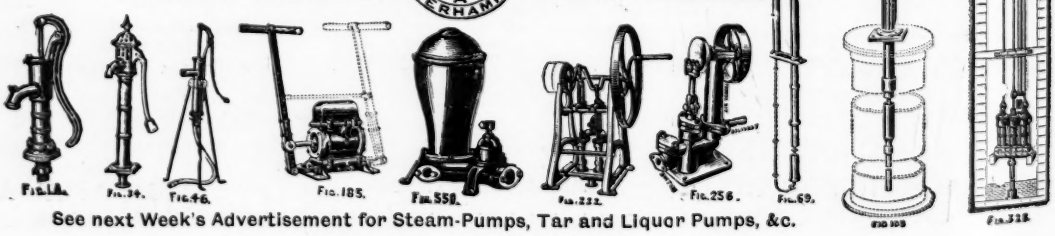
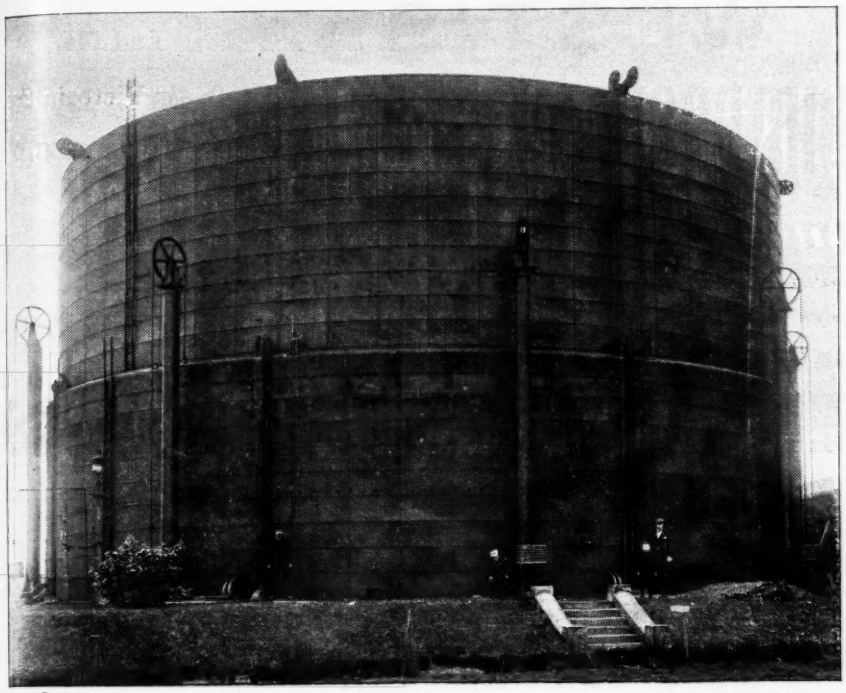
TRADE MARK.

FIRST AWARDS EVERYWHERE.



See next Week's Advertisement for Steam-Pumps, Tar and Liquor Pumps, &c.



INNER LIFT ADDED TO A SINGLE-LIFT GASHOLDER,

80 ft. diameter by 24 ft. deep. Both Lifts Cable-Guided. Counterbalance to Outer Lift on old Columns.

KIRKCALDY GASLIGHT COMPANY.

(*From a Photo.*)

PATENTEES AND MANUFACTURERS:—

ASHMORE, BENSON, PEASE, & CO., LTD.,

STOCKTON-ON-TEES.

H. KIRKHAM'S

PATENT "IMPERIAL" WASHER-SCRUBBER.

The Dover Gaslight Company,
Gas-Works, Buckland,
Dover, April 4, 1900.

Re H. KIRKHAM'S PATENT WASHER.

Please note I have much pleasure in stating that one of the above Patent Washers, 1,000,000 cubic feet capacity per 24 hours, has now been in regular action day and night for about 18 months, and is still working to our entire satisfaction.

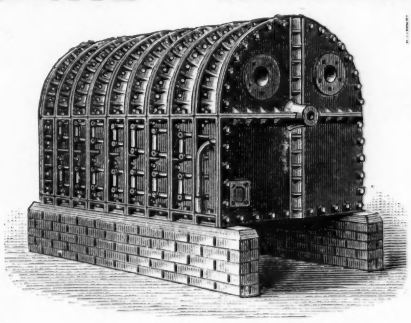
Six months ago I examined the interior, and then found the Scrolls clean and bright, due, in my opinion, to the flushing action of the fluid rushing from inside the Scrolls.

Also when passing its maximum quantity of gas it gives the minimum of pressure.

For further Particulars see my report to Mr. H. Kirkham, Feb. 8, 1899.

Yours truly,

RAPHAEL HERRING, Engineer.



The Dover Gaslight Company,
Gas-Works, Buckland,
Dover, Dec 29, 1900.

H. KIRKHAM, Esq.,

DEAR SIR,—Your Washer fitted with Patent Scroll Devices was put to work Nov. 9, 1898, and has been in regular use to this date.

I am sure you will be pleased to know that the excellent results we got when this was first started are still regularly obtained.

Yours truly,

RAPHAEL HERRING.

The Dover Gaslight Company,
Gas-Works, Buckland,
Dover, Feb. 8, 1899.

H. KIRKHAM, Esq.,

DEAR SIR,—Have now made further tests with the Washer fitted with your PATENT WASHING DEVICES, and have much pleasure in reporting that *the results were highly satisfactory*; also, I ascertained that the maximum results were obtained when the machine was working at three revolutions per minute. At this speed 13 to 14 gallons of water per ton of coal carbonized were converted into 10-oz. Ammoniacal Liquor, and at same time the Gas was free from Ammonia.

Should you wish further details, I will forward them.

I am, dear Sir, yours truly,

RAPHAEL HERRING, Engineer.

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Estimates given for a complete set of Segments for One Wheel, or for refitting the whole number of Wheels in a Machine; also for Washer-Scrubbers complete.

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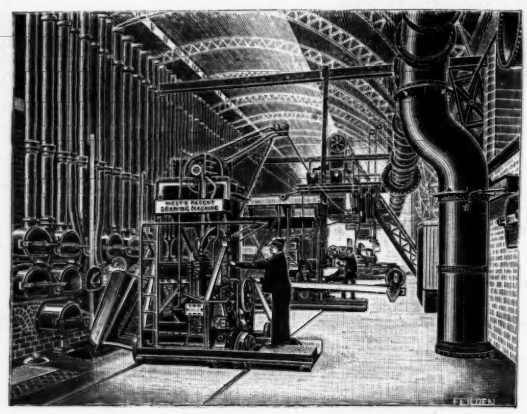

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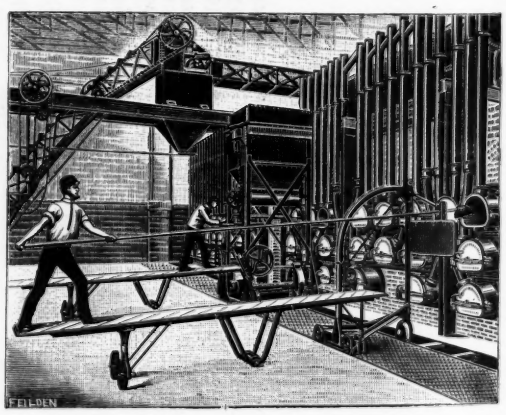

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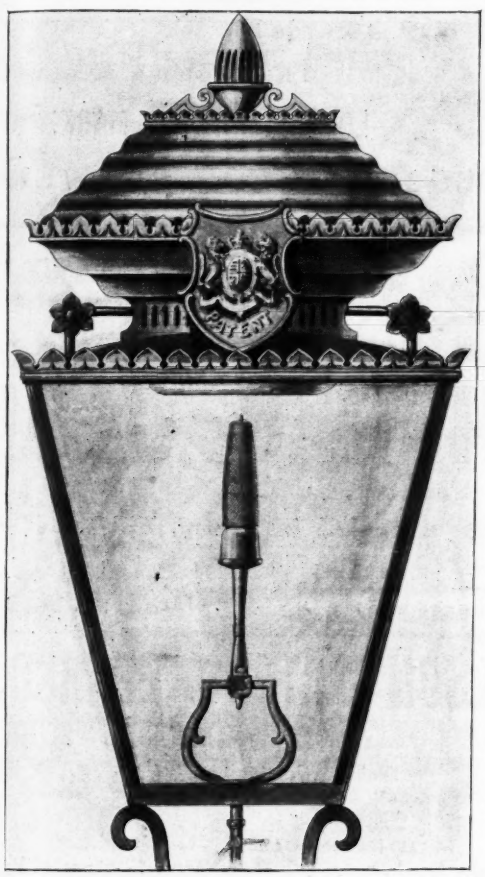

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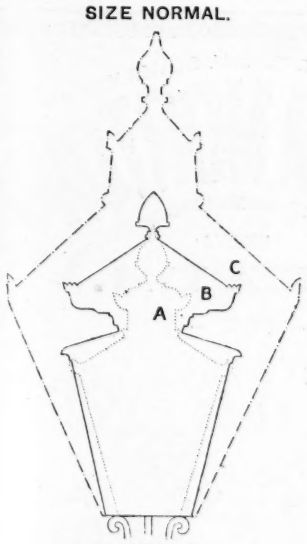

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